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JPRS-TND-86-016

30 JULY 1986

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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NOTICE

The following selections from Soviet media on the aftermath of the Chernobyl Nuclear Power Plant accident and the mobilization of labor and technology in the clean-up effort will be published in the series USSR REPORT: POLITICAL AND SOCIOLOGICAL AFFAIRS under the subtitle AFTERMATH OF CHERNOBYL NUCLEAR POWER PLANT ACCIDENT. This is a representative list of the items selected for that report.

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TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

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WORLDWIDE AFFAIRS

THIRD WORLD COUNTRIES BUY SWEDISH NUCLEAR WEAPONS TECHNOLOGY

Stockholm NY TEKNIK in Swedish 2 May 86 pp 12-15

[Article by Christer Larsson, Jan Melin: "Here's Where Sweden Sells Nuclear Weapons Technology"]

[Text] Sweden for many years has been producing and exporting advanced technology for the manufacture of nuclear weapons. This involves military flash X-ray devices which can transilluminate anything from high-explosive shells to sensitive nuclear weapons tests. The machines are exported under conditions of great secrecy to the high commands of the armed forces in Pakistan and India, among other places. But also Israel and South Africa have received machines from Sweden. These are countries which already have or are very close to having fully developed arsenals of nuclear weapons. Now the Swedish Government is to decide the issue of a new large export of machines to India, machines which run the risk of going straight into the country's underground nuclear weapons program.

The Swedish export of more or less obvious nuclear weapons technology is occurring at the same time as Sweden is officially pursuing an international arms reduction policy in order to prevent further nuclear weapons proliferation.

Now the armed forces of India are asking to be allowed to buy additional sensitive so-called dual-use technology from Sweden. These are products which, according to Swedish law, are of "decisive significance for the production of nuclear weapons."

Among other things, this includes military flash X-ray machines. These are very powerful machines, which in a fraction of a second develop a huge electric pulse of up to 10 billion watts. It is done by discharging a series of very powerful condensers.

Ten million watts is as much as 20 medium-sized power plants generate together. With that output, one can transilluminate anything from high-explosive shells to advanced nuclear weapons tests. Flash X-ray machines, as a matter of fact, are a key resource in all nuclear weapons programs.

In Sweden these systems were developed originally by the FOA [National Defense Research Institute]. It was for the Swedish nuclear weapons program during the 1960s, but also for conventional projectile tests.

It was when the Swedish nuclear weapons program was dismantled that the patent and production rights were transferred from the FOA to the newly formed company AB Scanditronix in Uppsala. That occurred in 1968. From this company the daughter company Scandiflash was later formed.

Behind Scanditronix and the arrangement with the FOA stood Curt Mileikowsky, the former head of SAAB [Swedish Aircraft Co]. Via Mileikowsky the machines were developed into an exclusive, controversial, but very profitable export business. For several years, Curt Mileikowsky has also been sitting on the FOA board of directors. Several attempts have been made at a high level to remove him from the board. But without success.

The attempts to get Mileikowsky out have been made because the FOA has a discreet but important role with regard to controlling the flow of nuclear weapons technology to Pakistan, India, Israel, and South Africa, among other places.

Straight Into India's Nuclear Weapons Program

These are the same countries whose military authorities are major customers of Scandiflash--the concern which was started through cooperation between the FOA and Mileikowsky, and in which Mileikowsky continues to be a partner. So now India is asking to be allowed to buy three of the largest flash X-ray machines--the 1,200-kV size--from Scandiflash. The output from a machine this size is 10 billion watts.

For all exports of machines with voltages over 500 kV, an export license from the Government has been required since 1984. This is based on the intimate connection between flash X-ray machines and nuclear weapons development. But up to 1984 this export was completely unregulated from Sweden. It had then been going on for nearly 20 years. The SKI [Swedish Nuclear Power Inspection Board] is now making a stand against the requested export to India.

The SKI says that the Swedish equipment runs the risk of going straight into India's nuclear weapons program.

The application which now is to be dealt with comes after a previous unsuccessful attempt to export the Swedish equipment via British intermediaries. That was last year. At that time the Swedish Government granted an export license to the firm of Hadland Photonics Ltd in England, for further export.

Behind Hadland stood India's Ministry of Defence as the buyer. This is confirmed by Terry Johnson, president of Hadland Ltd today. The fact that the deal nevertheless did not come off is due to the fact that the British Government in the end refused to allow the equipment, which in their eyes was strategic, to be sent on to India's armed forces.

Scanditronix, and later Scandiflash, are thus the commercial extension and continuation of the Swedish nuclear weapons program which began to be dismantled in 1968. At that time the Government declared officially for the first time that Sweden had decided to forgo nuclear weapons of her own. Otherwise, in a short time the country could have gone the full course and joined the other nuclear weapons powers.

No Governmental Restrictions

In 1970 Sweden signed the so-called NPT [Non-proliferation Treaty]. It prohibits both a country's own nuclear weapons development and the export of sensitive nuclear weapons technology. However, the government approves the continued export of the sensitive machine by Scandiflash. No export restrictions are laid down. This means that Scandiflash is developing into one of the world's leading producers of these extremely specialized machines. Among other producers are Hewlett Packard in the United States and Société de Verrerie et Thermométrie in France.

But with this, Scandiflash has also become established in an extremely risky and distorted market. Among the other actors in this market were a number of more or less sophisticated dummy firms, as well as the intelligence and security services of the superpowers. Nine customers out of ten are military agencies. Most of them need flash X-ray machines for conventional ammunition programs. But during the 1970s a new market came into being.

At that time Israel had already established itself as an unofficial nuclear weapons market in the Middle East. In 1974 the world was shaken by an Indian nuclear weapons explosion. This in its turn put momentum into new nuclear weapons programs in other countries. One of the countries that felt most challenged was India's neighbor country Pakistan.

Six years later, in about 1980, Pakistan had procured for itself a significant plant program for nuclear weapons production. According to American sources, developmental work took place in the area of ignition mechanisms and other key components. They formed the series of devices which were required to initiate the final nuclear weapon detonation. In 1982 Pakistan turned to Scandiflash in Uppsala with a large order for heavy flash X-ray machines.

It included three 450 kV systems and six 1,200-kV systems, the firm's largest machines. Appearing as the buyer was Pakistan Precision Engineering Complex Ltd. It is formally a daughter company of the state airline company PIA [Pakistan International Airlines]. But according to Indian intelligence sources, it is connected to Pakistan's Ministry of Defense, and thus is accessible for the underground nuclear weapons program. In November and December 1982, the nine flash X-ray devices were shipped out of Sweden.

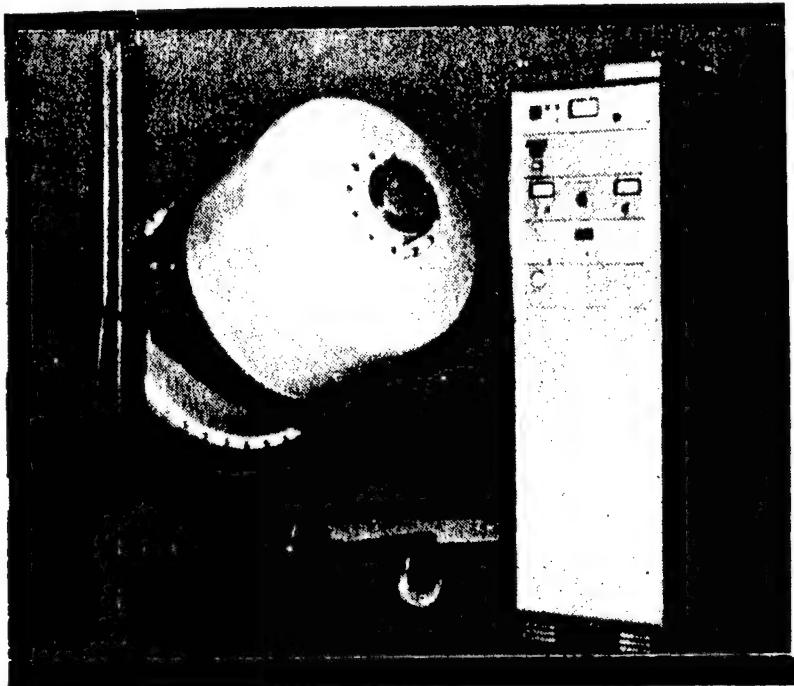
The export was noted by the American intelligence service. An attempt was made there--but in vain--to halt anything that could have the least connection with the Pakistani nuclear weapons program, among other things.

Earlier the same year, the United States had succeeded in putting a stop to a significantly smaller export of flash X-ray machines from Hewlett Packard to Pakistan. It was possible to do this by means of a battery of various legal clauses and export control regulations which have existed for a long time in the United States.

But in Sweden there did not yet exist any legislation on nuclear technology in 1982. In the same year, 1982, two 1,200-kV machines were shipped to the Soviet Union.

The United States now made new contacts with Sweden and asked for prompt and powerful measures to dam up the sensitive but freely flowing export. Since 1979 a government commission of inquiry had been working to look through the whole area of nuclear export. While the commission was working on legislation on nuclear technology, the American efforts to influence the Swedish authorities continued.

Among other things, the United States did not want Pakistan to receive help in installing and adapting the nine systems which had already been exported there. Installation and onsite testing was included in the contract with Scandiflash.



This 1,200-kV flash X-ray device has been exported to several prospective nuclear-weaon countries.

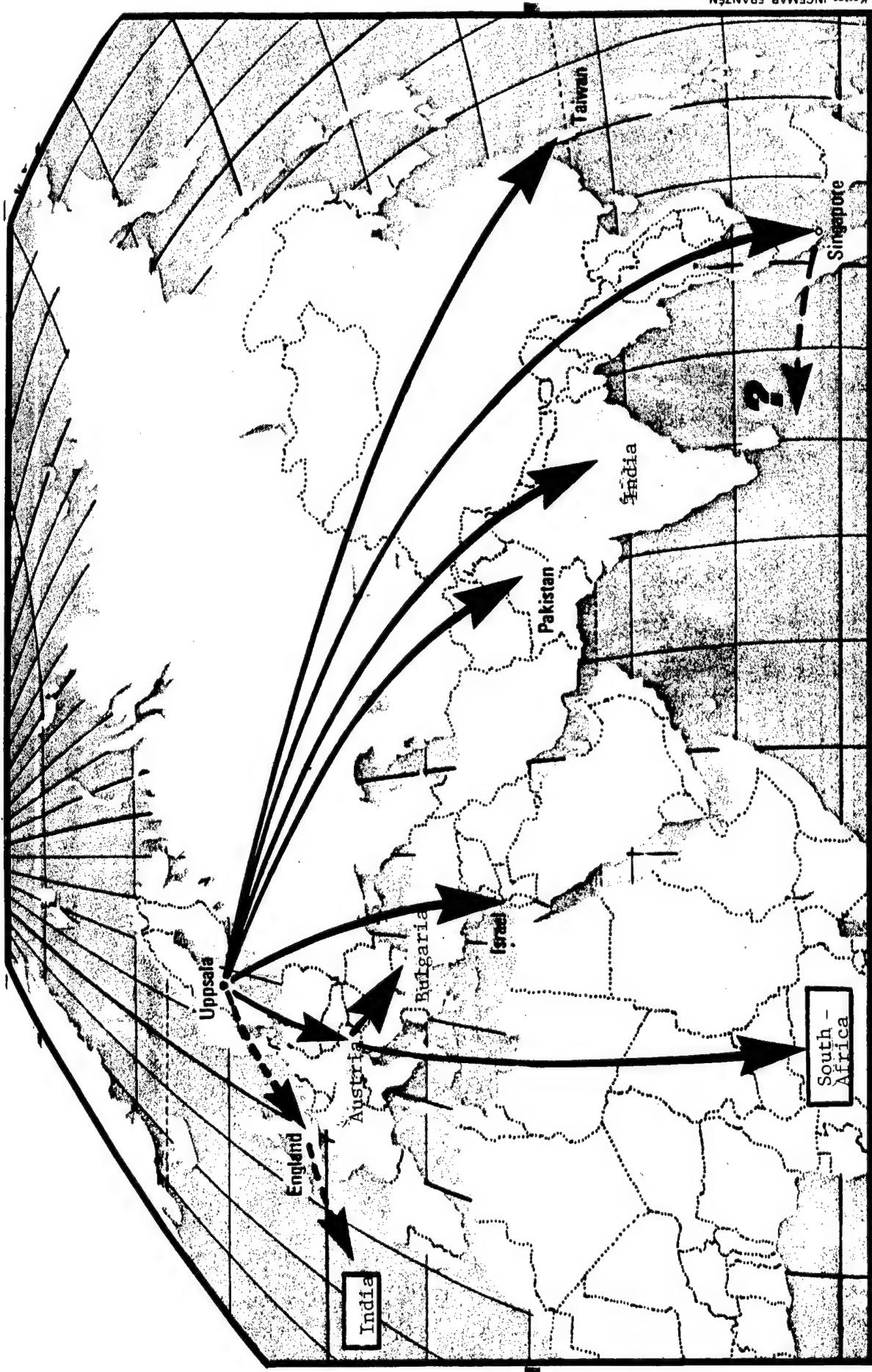
They Forced Us to Wriggle out of our Undertakings

But the company management yielded. It happened after repeated warnings from the FOA, which had significant opportunities to influence the new legislation which was on the way.

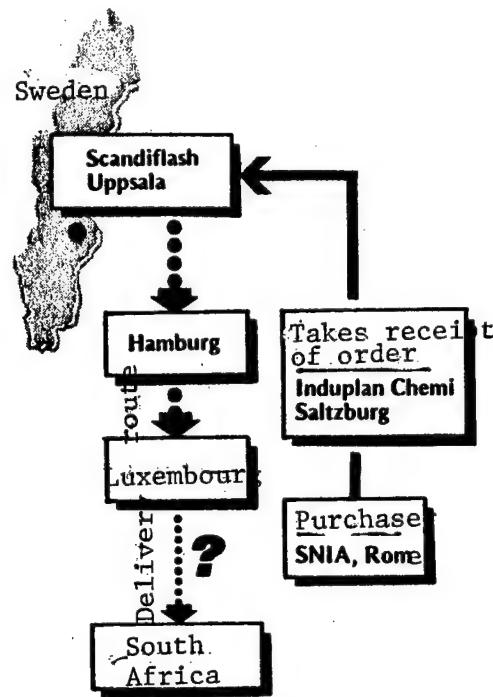
"They forced us to wriggle out of the installation work we had undertaken to do," Scandiflash president Arne Mattsson says today. "The United States just has to blink, and our authorities lie down."

In 1985, 3 years after the Swedish flash X-ray devices had landed in Pakistan, the American intelligence service CIA reported that Pakistan had made a successful test explosion with a complete nuclear weapon ignition. This was interpreted to mean that Pakistan had constructed a scale model of a nuclear weapon, fitted it with nuclear weapon electronics, and test-exploded the whole thing with conventional explosives.

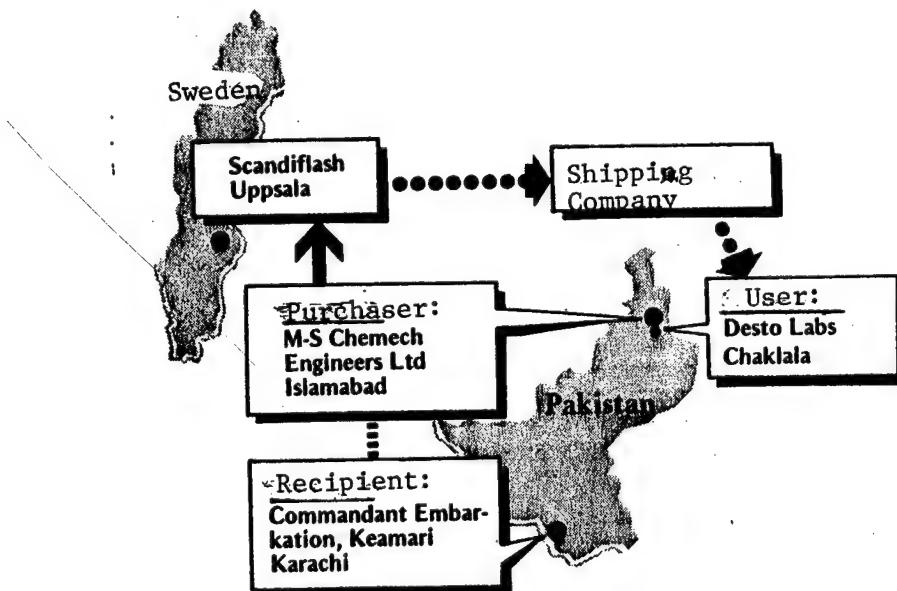
In order to study the extremely rapid processes that occur inside a nuclear device, one or more flash X-ray machines are required. They can trans-illuminate from a distance the two explosion chambers, the outer shell of steel, and the inner shell of lead, to see the details in the explosion process. The exposure time is lightning-fast: 20 billionths of a second.



This is the riskiest export of flash X-ray machines from Sweden. The shaded countries are the most controversial, since they are classed as risk countries in connection with nuclear weapons. Bulgaria, Austria, Singapore, and Taiwan are known for extensive technology smuggling.



From Sweden to an unknown destination via Frankfurt and Luxembourg. Several indications suggest that the Swedish machines went on to South Africa.



From Sweden to the Defense Research Institute (Desto Labs) in Pakistan. The purchaser was a civilian firm in Islamabad.

Swedish Machines Prerequisite for Pakistan

Detailed knowledge of the ignition processes is essential for Pakistan for two reasons: partly to maximize the yield of the devices that are planned and partly to achieve such a high level of sophistication that Pakistan in the end will not need to do any full-scale nuclear weapons tests. Such a test explosion would be immediately detected and would risk a violent reaction in the world around Pakistan, not least in the neighbor country, India. This is how Israel went about it. The fact that Pakistan has chosen the same path can be inferred from a number of American sources which specialize in the subject.

This means that one of the central prerequisites for this path may be the heavy flash X-ray machines which Scandiflash delivered from Uppsala already in 1982. Few persons outside Pakistan today know with certainty where these systems are installed.

In 1984 came a Swedish law on activity in nuclear technology. It introduced forcible measures to limit the outflow of Swedish so-called dual-use technology: equipment that can be essential for production of nuclear weapons. This means, among other things:

1. Flash X-ray Machines with a voltage above 500 kV. This is an adaptation to what is found in the world around. Produced in Uppsala.
2. Hot Isostatic Presses. Can be used to press special explosives for nuclear weapons. Produced by ASEA [General Swedish Electric Co]. Have been exported to South Africa and India, among other places.
3. Neutron Generators with special performance characteristics. Another FOA product for the Swedish nuclear weapons program. No longer produced in Sweden.

Customs was given the complicated responsibility of checking that these, and a long string of other products in nuclear technology, are not exported from the country without a permit.

But customs was not given any reinforcement or any competence in nuclear technology. That competence is found rather within the American intelligence agencies. Scandiflash caught their eye once upon a time, and now they follow the firm's contacts in the world around us. Particularly in India and Pakistan. Information which now and then is passed on to Swedish authorities.

"Someone has been tasked to keep watch on us," says Arne Mattsson, president of Scandiflash. "This is the case particularly in one of our customer countries. Every time I come home from there, I get a call from Swedish authorities who ask questions about what I have been doing."

What happened, then, when the new law on nuclear technology became effective in February 1984?

--September 1984: The Government granted an export permit for a 600-kV flash X-ray machine to the Bulgarian Ministry of Machine Building. The Government thought it had been given guarantees that the system would remain in Bulgaria. The country is notorious as a transit point for sensitive technology.

Export to International Weapon Smugglers

--December 1984: Scandiflash exported a double 450-kV (two-channel) flash X-ray machine to Singapore. They were able to do it without a license since the system was below the permit limit of 500 kV.

The purchaser was Chartered Industries of Singapore Ltd. This is the same firm that figured in a large suspected smuggling of Robot 70 [RBS 70] missiles from Bofors to Bahrain and Dubai.

--April 1985: Scandiflash flew out 2.9 tons of flash X-ray devices to Israel. This involved a half dozen machines rated at 300 and 450 kV. The consignee was the firm of Weissman & Lewy Ltd in Tel Aviv. For obvious reasons, Israel has never signed the non-proliferation treaty (NPT). This is because the country, by all accounts, has a significant arsenal of nuclear weapons.

--Autumn 1985: Scandiflash exported spare parts for previous machines that had been delivered to India, along with a new 300-kV machine for a military research institute in India. As a result of this, the machines became accessible for any desired purpose in the Indian armed forces.

--November 1985: The Government granted an export license for two 600-kV machines for the Italian firm of SNIA in Rome. This is one of Italy's largest war-materiel and nuclear-technology firms.

To South Africa Via Frankfurt and Luxembourg

What the Swedish Government overlooked when Minister of Energy Birgitta Dahl granted the export license was that the same company figured in an extremely mysterious and hitherto unexplained export deal in 1980.

It involved two 1,200-kV and two 300-kV machines, these too from Scandiflash in Uppsala. Everything was ready for transport to Rome in August 1980. It was the culmination of a long negotiation procedure which had started long before.

But at the same time as the systems were beginning to be loaded, a new firm was suddenly introduced into the deal. It called itself Induplan Chemie [Induplan Chemistry] and was located in Salzburg, Austria. Induplan Chemie stated that it was taking over the purchase from the firm of SNIA. At the same time, the request was made that the machines should be flown to Frankfurt am Main instead of Rome.

Within Scandiflash the deal was redirected, accompanied by increasing amazement. Salzburg or Vienna would have been more natural. When the heavy machines were landed in Frankfurt, the deal with Scandiflash was concluded.

Now the systems were redirected once more by Induplan Chemie. This time to Luxembourg. The little grand duchy scarcely has need of any flash X-ray machines. Least of all, ones of the caliber that is especially interesting in a context of nuclear weapons.

Rather, South Africa has this need. Several signs point unambiguously in that direction and no other. The fact that South Africa today is close to its first fully developed nuclear device is confirmed by a whole string of specialist sources.

This means that South Africa is a country for which flash X-ray machines are a necessity. A number of circumstances now suggest that the South African nuclear weapon program, via intermediaries, obtained its machines from Scandiflash.

--December 1985: Time for the next export merry-go-round. A smallish engineering firm in Pakistan, M-S Chemech Engineers Ltd, ordered six 450-kV machines. The firm is located in Islamabad. For some reason, the firm was acting as agent for a Pakistani army agency outside the metropolis of Karachi. The army stated that it was the consignee. Via Hamburg and Karachi, the six Swedish flash X-ray machines were routed to the garrison town of Chaklala, outside Islamabad.

The machines were unloaded at something called Desto Labs. According to the telephone directory for Islamabad, "Desto" stands for Defense Science and Technology Organization.

It is the research institute of the Pakistani armed forces, and is directly subordinated to the Ministry of Defense. It is also directly connected to the underground nuclear weapons program. That makes the Pakistani Ministry of Defense one of Scandiflash's largest customers, with purchases of at least 15 systems rated from 300 to 1,200 kV. According to an American intelligence report, which leaked out last year, Pakistan today is 1-2 years from its first fully developed nuclear device.

Within the Pentagon and the American State Department, further restrictions are now being contemplated on exports in the area of nuclear technology.

New Restrictions Could Mean End of Scandiflash

In those circles, there is very great irritation with the continued Swedish export of flash X-ray devices to the countries on the nuclear-weapon threshold.

Further restrictions can mean the end for Scandiflash, which only has this one product. It would also mean the end for the remnants of the Swedish nuclear weapons program. Remnants which for 20 years may have made active contributions to the underground nuclear weapons programs in Pakistan, India, Israel, and South Africa. It was possible for this to happen without Scandiflash's having stepped beyond the bounds of the new law on nuclear technology one single time. After all, the entire area was completely unregulated in Sweden up to 1984. Within a short time, the new law is now to be tested on a large scale. Three of the largest flash X-ray machines, rated at 1,200 kV, are involved.

Affects on Sweden's Credibility in Disarmament Context

"There is no doubt that these machines are primarily of interest in the context of nuclear weapons," says a highly placed source at the FOA. The purchaser is India's Ministry of Defense. As a result, the systems are accessible for any purpose desired.

Several indications suggest that this request is connected to the large multibillion-kronor deal between India and Bofors, which now is theoretically ready to proceed. People at the Swedish Ministry of Industry are saying "the Ministry of Foreign Affairs can comment on that." At the Ministry of Foreign Affairs, they are declining to comment on the matter.

At all events, India has made it clear that a positive decision is expected there in the Scandiflash matter. Because India has few alternatives. As a result of her demonstrative nuclear weapon explosion in 1974, India is effectively blocked in the United States from anything that has the least little bit to do with nuclear weapons.

The anticipated decision by the Swedish Government in the matter of India therefore will have an influence on everything Sweden has in the way of credibility in the disarmament context.

This is How Flash X-ray Device Works

Flash X-ray devices [FXDs] are used primarily in weapon development, both for nuclear weapons and conventional weapons.

What distinguishes a flash X-ray device from an "ordinary" X-ray unit, which is used in medical care, for example, is that the flash X-ray device develops a much larger output in a very short time period.

When a FXD is used, one places what one wants to study between the FXD and the camera that is to record the course of events: an explosion, for example. Explosions form large gas and dust clouds around the point of burst.

X-ray

To see through this cloud, X-ray study is required. To protect the X-ray equipment, a protective barrier is required: thick steel, for example. Very high outputs are needed for the X-radiation to be able to force through the steel barrier. A large FXD may develop outputs of above 10 GW (10 billion watts), which corresponds to the combined output of 20 medium-sized nuclear power plants.

The output is developed over a very short time: about 20 ns (20 billionths of a second). The short pulse time is important because the processes people want to radiograph go enormously quickly: for example, the shock wave that results from an explosion.

Simulated Explosion

It is not only explosions that can be studied with a flash X-ray device. One can also get a peek at what happens when a shell penetrates various materials, or how the shell's fuze behaves.

When FXDs are used in nuclear weapons development, it is not only the nuclear explosion itself that one studies. Such an event is impossible to radiograph because the X-ray equipment would then literally burst into atoms. What one examines is a simulated nuclear explosion in which the fissionable nucleus--plutonium, for example--is replaced with a lead nucleus. But even a simulated nuclear explosion requires thick protective barriers to protect the X-ray equipment.

Shrinking

Then relatively powerful FXDs are required. One can also scale down (shrink) the simulated nuclear explosion. Then one can get by with a less powerful FXD. But it is not only the penetrating power of the X rays that determines how much information one can read from a radiograph. With today's enormously rapid development of digitized image analysis and image processing, one can now read more information from an X-ray picture than was possible just a few years ago. Or, as the inventor of the Swedish FXD expresses it, "With computerized image processing, a skilled physicist can test a great deal even with a small FXD."

Export With No Rules Up To 1984

In 1984 came the law intended to halt the export of flash X-ray devices.

It is called the "Law on Activity in Nuclear Technology," and it is aimed at "making it possible to fulfill the obligations ensuing from Sweden's agreements to the end of preventing the proliferation of nuclear weapons."

The obligations referred to were incurred when Sweden signed the treaty on the non-proliferation of nuclear weapons (NPT) which was concluded in 1968. With that, Sweden undertook not to export products which can contribute to other countries' developing nuclear weapons.

The Government bill on nuclear technology states that the export control should be limited to a small number of well-defined products. This is so that it will be possible to have an effective control. The products covered by the law "shall have decisive significance for the production of materials for nuclear devices."

No Obstacle

The products that the Government wants to control are listed in a special annex. Included here as a special item are flash X-ray devices larger than 500 kV. The law came out in 1984. Thus, up to then there was no obstacle to exporting even the largest flash X-ray devices from Sweden.

Robert Nilsson, who developed the Swedish flash X-ray device, says, "it strikes one as old-fashioned to set a limit at 500 kV for when a flash X-ray device becomes interesting for nuclear weapon research. I think it is enormously difficult to set any kinds of limits."

The normal process when one wants an export permit for flash X-ray devices larger than 500 kV is this: The application is sent to the SKI [Swedish Nuclear Power Inspection Board], which makes a judgment: Partly on whether the recipient can be suspected of being engaged in activity in nuclear technology, partly a general judgment of the country of destination. For example, whether it has signed the NPT, etc.

The SKI report then goes to the Ministry of Industry, which consults with the Ministry of Foreign Affairs and the National Defense Research Institute about the suitability of exporting. But the Government has the option of permitting export even if, for example, the SKI recommends rejection of an application for export. For, as it says in the government's bill on nuclear technology, "Above and beyond considerations of the non-proliferation type, the government naturally has the option from case to case of taking other factors into account, including those associated with foreign, industrial, and commercial policy."

[Boxed items]

The Swedish Nuclear Power Inspection Board says no to the export of flash X-ray devices to India, since there is a risk that they may be used for nuclear weapons development:

"Flash X-ray devices are among the so-called "dual-use" products, and find their main application within non-nuclear military research and development. Flash X-ray devices with high voltage, 1,000 kV or more, however, do have a certain significance in the development of nuclear devices."

"India, which in 1974 conducted a test explosion of a nuclear device, has not signed the non-proliferation treaty and has placed only a limited number of its domestic nuclear facilities under international inspection."

"With regard to what was set forth above, and the fact that acceptable assurance has not been given with respect to the non-nuclear use of the equipment and with respect to the documents the Inspection Board otherwise had access to in processing the matter, the Inspection Board cannot support the application."

The products covered in the law on nuclear technology--for example, flash X-ray devices over 500 kV, require export permits because they can be used in nuclear weapons development. The quote is from the Government's bill:

[Text underlined] "Export controls therefore should include only strategically significant products. The requirement that the products shall be strategically significant may then specify that they shall have decisive significance for the production of material for nuclear devices."

Even if the Swedish Nuclear Power Inspection Board, for reasons relating to nuclear weapons, should say no to an export, the government can approve a deal. The quote is from the Government's bill on nuclear technology:

[Underlined text] "Above and beyond considerations of the non-proliferation type, the government naturally has the option from case to case of taking other factors into account, including those associated with foreign, industrial, and commercial policy."

Pakistan

Pakistan is believed to have everything it needs in order to produce nuclear weapons. In the secret facility of Kahuta outside Islamabad, according to American sources, the capability exists of producing about 15 kg of weapon-quality uranium per year.

Pakistan has also been mixed up in several smuggling deals involving nuclear weapons technology, including deals in Holland and the United States. Examples of the products that were halted are high-speed telescopes and ignition mechanisms for nuclear weapons.

In 1984 Swedish authorities stopped the firm of Scandiflash from installing large flash X-ray devices which had previously been delivered to Pakistan.

The primary reason why Pakistan presumably has not yet gone all the way with production of nuclear weapons is pressure from the United States. They have threatened to halt their large deliveries of conventional weapons to Pakistan if the latter becomes a nuclear-weapon power.

India

In 1974 India carried out what Indian sources called a "peaceful nuclear explosion." It is the only test explosion that India has carried out. The official attitude is that they will not procure an arsenal of nuclear weapons, on condition that Pakistan does not.

Rajiv Gandhi, meanwhile, has indicated that India has all the components that are needed to produce nuclear weapons. He has also said that "if we decide to become a nuclear-weapon power, we can do it within a few months at most."

In August India announced that they had dedicated a research reactor that had the capacity to produce plutonium that was not subject to international controls. Despite strong pressure from the United States, India has refused to put several of her nuclear installations under international control, including the facility that produced the plutonium for the test explosion in 1974.

Israel

Israel, which has not signed the non-proliferation treaty, has several nuclear facilities which are not under international control. In some of these it is possible to produce weapon-grade plutonium, albeit in small quantities.

As far as is known, Israel has not carried out any test explosion, but according to international expert opinion, they nonetheless have complete nuclear weapons.

A cautious guess, according to these sources, is that Israel has about 25 nuclear weapons of the Nagasaki size, 20 kilotons.

An American newsletter which is usually well informed in these matters, wrote in May 1985 that Israel had nuclear-tipped short-range missiles of the Jericho II type, as well as nuclear artillery.

Israel has also figured in several illegal deals since the 1960s, when the country got hold of both highly enriched uranium and plutonium.

South Africa

In 1977 American and Soviet reconnaissance satellites discovered that South Africa was building a facility for nuclear weapon tests.

After international pressure, with a threat of breaking off relations with South Africa, they went along with not carrying out any test explosion. South Africa also stated that they would no longer continue to develop nuclear weapons. But they have declined to furnish evidence of this.

In 1979 a U.S. satellite detected a bright flash off South Africa's coast. It was suspected of being a nuclear weapon explosion. No additional evidence for this was made available. According to American sources, however, there is indeed evidence that since mid-1984 South Africa has quietly been increasing her capacity to produce nuclear weapons. According to these sources, South Africa can produce enough highly enriched uranium for several nuclear weapons per year.

United States and Britain Have Tougher Export Regulations

In the United States there are also producers of flash X-ray devices, and in Britain there is a firm that buys Swedish FXDs which are then reexported to other countries. Both in Britain and in the United States, export permits are required for FXDs rated above 500 kV.

FXDs have their own clause in the American export regulations, Paragraph 399.1, item 1553A. This states that an export permit is required for all countries except Canada. The reason for this is given as "national security and the non-proliferation of nuclear weapons."

Other Options

In Britain FXDs are controlled by "Custom and Excise, the Export of Goods (control) order 1985."

But both in Britain and the United States, there are other options besides these regulations which can limit the export even of FXDs with a lower voltage than 500 kV. This in contrast to Sweden, where it is always permissible to export FXDs rated at less than 500 kV.

Small Flash Devices

An example of the tougher regulation in the United States is when an export of "small" flash X-ray devices to Pakistan was halted. It happened when it was revealed that one of the Pakistanis who were to be trained on the FXDs they had ordered turned out to be a nuclear physicist. Such a factor can never halt an export of "small" FXDs from Sweden.

Scandiflash Deputy Director: "I Have No Guarantees"

"Purely theoretically, our largest flash X-ray devices can be used for the development of nuclear weapons. But in practice I think it takes significantly larger machines." So says Arne Mattsson, deputy director of Scandiflash AB, the firm that produces the Swedish flash X-ray devices.

Arne Mattsson also says that he has never seen any connections to any possible nuclear weapon program on the part of the foreign customers which have bought equipment from Scandiflash. "The installations of our machines that I personally studied in Pakistan, for example, also suggest that the application was development of conventional weapons."

No Guarantee

"But I cannot guarantee that none of our machines has become part of a nuclear weapons program; no one can do that," Arne Mattsson believes. "I also tell the FOA what contacts I have had, so that they can check whether there is any nuclear weapons connection with these. But the FOA has never indicated anything in that direction."

Pressure from the United States

The law from 1984 that requires Government permission for the export of large flash X-ray devices is criticized by Arne Mattsson. "I believe it was passed after pressure was applied by the United States. Not because flash X-ray devices could be used for nuclear weapons development, but because for strategic reasons the United States wants to prevent certain countries from reaching too high a technological level."

Unpleasant Monitoring

"We are making a 100 percent effort to eliminate all risks of our flash X-ray devices being used in a nuclear weapons program. But to have to dance to the Americans' piping for other reasons--that I do not care for. I also think it is unpleasant that the Americans are monitoring us in some way that I am not aware of. They are extremely well informed about what we are working on."

Swedish authorities as well are monitoring Scandiflash's doings very closely. "Every time I have come home from a sales trip in Pakistan, for example, I get a telephone call from a Swedish authority that wants to find out what I've been up to," says Arne Mattsson.

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WORLDWIDE AFFAIRS

BRIEFS

COOPERATION WITH CEMA--Finland is going to cooperate with CEMA in the nuclear area. Metatom, representing Finland's nuclear power firms and equipment industry, has entered into a cooperative agreement with Interatomenergo, the joint organization representing the Soviet Union and the small CEMA countries. The objective of this cooperative agreement is to exchange information on, among other things, product development and standards. The ultimate goal of the agreement, however, is to make business decisions. Commercial deals are to be arranged among private firms and [CEMA] trading companies under a just signed "umbrella" organizational agreement. Metatom is a working group of the Metal Industry Central Federation, whose member companies manufacture components used both for nuclear power plant construction and for maintaining them. In Finland, for instance, are made pressure vessels, heat exchangers and valves. In addition to construction components, Finland exports instruction simulators, radiation gauges and automatic controls. [Text] [Helsinki HELSINGIN SANOMAT in Finnish 4 July 86 p 23] /6662

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HONG KONG

REPORTAGE ON OPPOSITION TO DAYA BAY PLANT CONTINUES

'Unbiased' Panel Needed

Hong Kong HONGKONG STANDARD in English 4 Jun 86 p 3

[Text]

A COMMITTEE should be set up to look into the viability and feasibility of the proposed Daya Bay nuclear project objectively, a risk assessor said yesterday.

The committee should consist of scientists, psychologists, risk assessors, environmentalists, sociologists and members of the public, Dr Ip Po-keung of Lingnan College added.

However, he cautioned that the experts should not be all from Britain, which has vested interests in the construction of the plant, but from opposition groups and other countries.

He said the public has not been provided with a fair and objective view of nuclear technology.

The involvement of the Government in the project means the entire

decision-making process is biased.

Speaking at a luncheon meeting of the Y's Men's Club of Harbour View, Dr Ip said there are many fallacies in the arguments of the party favouring the project.

He said in calculating the risk, the whole fuel cycle should be taken into account, including the human factor which has been the cause of accidents in several countries.

It is wrong to centre the debate only on the type of reactor or the technical design, he said.

Even if the type of reactor to be installed in Daya Bay is completely different from that in the Chernobyl disaster in the Soviet Union, the safety of nuclear technology is still debatable.

Dr Ip said he very much doubted the ability of the Chinese to maintain the nuclear plant.

"They are starting from the beginning; things like administration, legislation, technology, supervision, environmental protection,"

he said.

"All of them have to be gradually improved. Therefore, it is dangerous to go ahead with the highly technical and very risky nuclear plant project," he explained.

It is also wrong to calculate the risk without considering the consequences of an accident. If the results are disastrous, the degree of risk is much higher, he said.

Dr Ip pointed out that it is wrong to compare nuclear accident risk with other everyday risks, such as traffic accidents.

The consequences of a nuclear mishap will be borne by the Hongkong people, who cannot keep away whether they like it or not, while the large companies are the ones that will benefit from the construction of the plant, he said.

History and the experiences of other countries have shown that nuclear energy is not all-important, Dr Ip added.

Just as the nuclear plant in the Philippines can be disused, it is not too late to shelve the Daya Bay nuclear project, he noted.

Power Company Response

Hong Kong SUNDAY STANDARD in English 8 Jun 86 p 3

[Text]

CHAIRMAN of China Light and Power Company yesterday said the safety problems of the Daya Bay nuclear power project should be a matter for China, the owner of the plant.

His company will just purchase power from China, said Lord Kadoorie.

But the company, through a subsidiary, has a 25 percent stake in the project and has agreed to purchase 70 percent of the power generated from the plant.

He said the directors of the company are responsible persons who have always looked after the interests of the Hongkong people.

Speaking after the opening of the Kadoorie Agricultural Research Centre, he stressed that the plant would be as safe as humans could make it.

But he refused to comment on recent public objections to the nuclear project.

The public, including many pressure groups, have called for a halt to the project until there is an absolute guarantee of its safety.

Umelco's Public Utilities Panel has promised to disclose as much information as possible relating to safety measures at the plant, but has not asked that the project be halted.

Legco member Miss Maria Tam said recently there would be an open discussion with experts to answer questions on the project.

Information would be passed on to the public through a press meeting after each panel discussion, or the Chinese authorities could contact the press.

A Regional Council member, Mr Tsang Kwong-yuen, has joined the opposing force and has asked that the project be shelved.

In a letter he sent the *Standard* yesterday, Mr Tsang said human technology, no matter how advanced, cannot be absolutely faultless.

He writes that the Chinese authorities should weigh the danger posed to the Hongkong and Chinese people and seriously reconsider the project.

Monitoring System Proposed

Hong Kong SOUTH CHINA SUNDAY MORNING POST in English 8 Jun 86 p 1

[Article by Ann Quon]

[Text] A PROPOSAL to allow Hongkong to operate a separate surveillance system to monitor radiation levels at the Daya Bay nuclear plant is to be considered by Chinese authorities.

The system would be hooked up to a similar one at Daya Bay so local authorities would know immediately when a nuclear accident has occurred at the plant.

If the proposal is accepted it means that any warning at Daya Bay would be simultaneously raised in Hongkong.

This would prevent valuable time from being wasted, if the Hongkong authorities were to rely on the Chinese to notify them of any sudden change in radiation levels.

"It's still being considered, but if it is approved, in the highly unlikely event of an incident, it will be possible for the Royal Observatory to be aware of the development," said Mr John Yaxley, the Secretary for Economic Services.

This is separate from a measure currently being undertaken

by the Hongkong authorities to monitor local radiation levels.

The Hongkong authorities have already held preliminary discussions with the Chinese, who are aware of mounting local concern over the safety aspect of Daya Bay as a result of the Chernobyl disaster in April.

The proposal was put forward to a group of visiting Chinese physicists last week and it is understood that they will study the practicality of such a measure before further recommendations are made, according to the head of the Royal Observatory, Mr Patrick Sham.

"We don't know what form the proposal will take, but it will be some kind of communications link," Mr Sham said.

One possibility is to have a computerised hook-up which could provide up to the minute data on radiation levels at the plant. This would mean that Hongkong would have to have an inter-calibrated computer that matches system to be used in Daya Bay.

Another possibility, but less desirable, is that the surveillance could be as minimal as setting up a "hot-line" telephone link to relay information.

The Hongkong Government initiative in seeking Chinese approval for establishing a monitoring system follows discussions held recently with the Umelco security panel.

At the meeting, panel members impressed upon government officials the need for more guarantees about the safety aspect of Daya Bay.

So far, those measures have involved only to a programme to monitor changes in local radiation levels that may be affected by Daya Bay.

The Royal Observatory is in the process of setting up a central laboratory in King's Park that will keep tabs on radiation level changes in the territory.

Expensive monitoring equipment has already been ordered and should arrive next month.

The whole system, according to Mr Sham, should be in place by the end of the year.

Antinuclear Protest

Hong Kong HONGKONG STANDARD in English 8 Jun 86 p 4

[Article by Katherine Saltzstein]

[Text]

MORE than 250 people gathered at the Mariner's Club yesterday for what was Hongkong's largest anti-nuclear demonstration.

Anti-nuclear activists in Hongkong grouped together several years ago after plans for a nuclear power plant at Daya Bay were announced. But the recent Chernobyl accident has increased their numbers.

After listening to speeches by eight lecturers and teachers from colleges and universities in Hongkong, the mostly young audience, marched to the Star Ferry pier where they launched a signature campaign.

The atmosphere was lively, as members of the audience grabbed the microphone during a question and answer session, to make suggestions.

Mr Ip Kun-wan, 25, a student at Hongkong University, urged the people of Hongkong to shut off all power for 15 minutes "to show we are against the nuclear plant."

His suggestion was greeted with loud applause.

Bringing in some unexpected humour, panel convenor, Mr Fung Chi-wood, a minister in Kowloon, asked if anyone in the audience supported nuclear energy. There was, of course, no response and the audience burst into laughter.

Panelists and members of the audience wore yellow T-shirts with a red sun logo saying: "We want life and sunshine not nuclear energy."

Several speakers lashed out at the nuclear industry, which they said, built plants without consulting the public.

"Nuclear power is contrary to democracy and civil rights. Popular opinion is being ignored," said Dr Man Si-wai, a lecturer at the Social Science Department of Ling Nam College.

Speakers were critical of the Honkong Government for the lack of information on the Daya Bay plant.

China Light and Power, also came under heavy criticism for its part in the Daya Bay project. The speakers said China Light was trying to dodge responsibility. They were referring to a recent statement by owners of China Light and Power that they were

not major decision-makers in the project.

Dr L K Ding, a general practitioner, said research showed a higher incidence of cancer among those living near nuclear power plants.

"Radioactive substances can hardly have a safety standard. It accumulates inside the body and causes cancer. Even if the safety standards were 99.9 percent the 0.1 percent leakage into the soil, water and air will harm human beings. It will cause genetic mutation and affect future generations," he said.

Several speakers said alternative forms of energy should be considered for the Daya Bay site.

The Honkong and Chinese governments have invested so much money in the project that it would be difficult to stop it now, said Dr Larry Chow, a lecturer in Geography at Baptist College. But, he added, the governments should consider establishing a coal-fired plant instead.

He also urged the government to prepare plans for the evacuation of Hongkong and for ways to supply water and food to the 5.5 million people living here in case of an accident.

Interference in PRC Affairs

Hong Kong SOUTH CHINA MORNING POST in English 13 Jun 86 p 22

[Article by Wong Wing-Hang]

[Text]

THE fear of being accused of interfering in China's internal affairs stopped Yaumati District Board members from denouncing the Daya Bay nuclear power plant.

Although members expressed concern over the safety threat from the plant, they stopped short of passing a motion condemning it.

Mr Lai Wing-tak and Mr Chan Wai-wang tabled a statement at yesterday's board meeting condemning the plant's construction, claiming it would "gamble with the lives of Hongkong people."

Mr Lai said although both China and Hongkong officials had repeatedly guaranteed the plant's safety, no one could be 100 per cent certain.

"A comprehensive contingency plan must be formulated since Hongkong people will have nowhere to hide if there is an accident," he said.

But when the board secretary asked whether the two wished to put their statement into some form of motion so that the district board could vote on it and make a stand on the issue, the two declined.

Mr Chan explained that Hongkong was now in a special position and they had no intention of interfering with China's decision to build the plant.

"We are only doing our duty as district board members by reflecting the concern of residents in the district," Mr Chan said.

He added that the decision to build the nuclear plant was made by China's leaders and any change in the plan

might be a blow to their dignity.

"But they have to consider which is more important, the lives of five million people or their dignity," he said.

He was supported by another member, Mr Ng Kin-sun, who said at first residents paid little attention to what was happening in Daya Bay.

"But now, after the accident in the Soviet nuclear power plant, they are worried about their safety," he said.

Mr Ng said although the Hongkong Government could do nothing to alter China's plan to build the plant.

It was suggested in yesterday's meeting that the Government should begin to educate the public on the ways to detect and guard themselves from radiation.

District Board's Letter

Hong Kong HONGKONG STANDARD in English 13 Jun 86 p 3

[Excerpt]

EVERYONE in Hongkong is concerned about the construction of the Daya Bay nuclear power plant, but no one knows what to do about it, said members of the Yau Ma Tei District Board yesterday.

The members approved a short letter to be sent to the Government's Economic Services branch expressing their concern. Several members said they would like more information on the proposed plant before issuing a stronger statement. They would like government officials with knowledge about the plant to report to them, they said.

"The fact that the station is situated less than 100

kilometres away from Hongkong and that no machinery can ever be perfectly safe raised anxiety regarding the safety measures of the station," the letter says.

The members claimed they had received calls and letters from their constituents expressing concern about the safety at the plant.

"Before the accident at Chernobyl, people are saying, they did not know much about nuclear power stations. Now, they are very worried," said District Board member H W Ng.

He added that people are concerned about evacuating Hongkong residents and about the effect of radiation on future generations.

PRC Spokesman's Remarks

Hong Kong HONGKONG STANDARD in English 14 Jun 86 p 2

[Article by Katherine Saltzstein]

[Text]

OWNERS of the proposed Daya Bay Nuclear Power Plant in China are monitoring the reaction of the people of Hongkong to the plant, a spokesman for the Guangdong Joint Venture Company Ltd said yesterday.

"We are monitoring the situation very carefully. Our people in Shenzhen are fully aware of the reaction in Hongkong," said the spokesman who asked not to be named.

Company officials, he said, had read newspapers and watched television reports of the reaction to the proposed plant to be built just across the border, about 50 km from Hongkong.

Last weekend, organisers of a movement calling for the scrapping of the plant began a signature campaign.

Spokesmen for the movement expressed concern over the safety of the plant.

The \$3.5-billion project is a joint venture between the Guangdong Nuclear Investments Companies Ltd, which

owns 75 percent, and the Hongkong Nuclear Investment Company Ltd, which owns the other 25 percent through China Light and Power Company.

Because companies in China are state-owned, the government there is very involved in the project, the spokesman said.

Asked if the company would consider replacing the nuclear plant with another type of plant, such as one fired by coal, he said: "we are still studying the situation. We are consulting the government. Our attitude is — 'we are open'. We will consider the reaction of the people of Hongkong.

"The accident in Russia was of great concern to all people, including us. It is only natural for people to express concern after Chernobyl. People around the world had a similar reaction."

Top Chinese government officials have said this week that the Daya Bay plant will proceed as planned, he said.

"Safety will be our No 1 priority," he said. "Our company is totally committed to safety."

Plant and government officials want to study details of the Chernobyl accident, he said.

Asked whether company officials will consider a change in the site for the plant because some Hongkong scientists have said its present location northeast of the territory means that winds blowing towards the territory will maximise the effects of radioactivity, he said:

"The choice of the site was made after extensive studies had considered all possible factors."

He would not comment on the question of the lack of an evacuation plan for Hongkong but said again that "the highest possible safety standards are proposed for the plant".

He referred questions relating to Hongkong to the China Light and Power Company.

However, Mr Dominic Tai, China Light's public affairs officer, said: "The ownership is Chinese. Hongkong is a minority shareholder."

Asked if the company would move the plant, he said: "I am not in a position to comment. We are viewing all options to producing electricity. We can't rule out any options."

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HONG KONG

HONG KONG CONCERNS OVER DAYA BAY PLANT REPORTED

Antinuclear Petition Planned

Hong Kong SUNDAY STANDARD in English 1 Jun 86 p 6

[Article by Lin Bin]

[Text]

HONGKONG collected its first substantial piece of political fall-out from the Daya Bay nuclear power station plan last night when a joint conference of local pressure groups declared open war on the proposal.

The groups plan to hold a public forum on the plan, and to collect half a million signatures on an anti-nuclear petition.

Today a five-man religious delegation from New Zealand will land in Hongkong on their way to Europe, where they will put the case against nuclear power in East Asia and Hongkong in particular.

More than 40 pressure groups were represented last night at the fourth meeting of the Joint Conference to Contend for the Cancellation of the Daya Bay Nuclear Plant.

They approved a declaration officially establishing the anti-nuclear Joint Conference.

Organisations represented included the Joint Council for Concern over Nuclear Energy, the Christian Industrial Committee and the Hongkong Friends of the Earth, as well as civil servants' and students' unions.

The groups held their first meeting on May 13 and agreed on the need for joint action to press for the cancellation of the Daya Bay project.

The Joint Conference has agreed on four points. The first opposes any nuclear plant near Hongkong because of the world-wide record of accidents and disasters with this kind of power station.

The second point condemns China Light and Power for attaching more importance to the profits to be gained from a nuclear plant than to the anxieties it will cause to local residents.

The Joint Conference considers that local consumers of electricity should have the right to more information on the nuclear plant, and the right to refuse to have their electricity generated in this way.

Thirdly the Joint Conference calls on the Hongkong government to publish the results of safety studies on the proposed plant, and evacuation plans in case of emergency.

It says that public money should not be invested in the plant.

Fourthly, the joint conference says that because the planned nuclear plant is so close to Hongkong, there would be insufficient time to take appropriate precautions in case of an accident. So it is opposed in principle to the idea of a nuclear plant in Daya Bay.

The Joint Conference will hold an open forum on June 8 in the Mariners' Club to discuss the Daya Bay project.

The convenor of the Joint Conference, Mr Fung Chi-wood, said experts and scholars qualified in the field of nuclear power would be invited to attend the forum and give speeches.

Representatives of social groups will also be present to give their opinions on the nuclear plant.

The Joint Conference also hopes to collect 500,000 signatures on a petition which will make two points:

- We do not wish Hongkong to run any risk of nuclear radiation.
- We want the construction of the Daya Bay nuclear plant to be stopped immediately.

The signatures will be sent to the Chinese and Hongkong governments, as well as the company building the nuclear plant.

An observer thought that the Hongkong government would ignore the petition, however numerous the signatures, but the Chinese government might be

influenced by Hongkong opinion if enough signatures were collected.

He said Hongkong people had to try to put across the point that Hongkong could be completely destroyed by an accident at Daya Bay.

And on the other hand, Hongkong's rumour-prone markets would often be influenced by false reports about the nuclear plant, circulated by speculators hoping to profit from the resulting turbulence.

Fear of the plant would make people less willing to live in Hongkong.

One pressure group said they were worried about the possibility of the nuclear plant being exploited or interfered with by terrorists.

It seemed to them that Beijing had not considered the danger of deliberate attempts to sabotage the plant.

They hoped that on mature consideration the Beijing authorities would be willing to change their decision.

City Down Wind From Plant

Hong Kong HONGKONG STANDARD in English 31 May 86 p 3

[Text]

A SENIOR Lecturer at the Hongkong Polytechnic says the proposed Daya Bay Nuclear Power Plant should be moved to a site where the winds do not blow in the direction of Hongkong.

Mr Desmond Luscher, from England, who is a mechanical engineering lecturer with a speciality in comparative energy, has made his ideas public before, he said, but some officials have not treated his remarks seriously.

The Daya Bay plant, which is scheduled to provide Hongkong with 75 percent of its energy needs by 1992, is to be built northeast of Hongkong, just across the Chinese border.

"The wind blows from the northeast for eight-and-a-half months a year," said Mr Luscher.

When a member of the Legislative Council suggested recently that the plant be moved to the northwest, former Financial Secretary, Sir John Bremridge, responded by saying that the winds blow in the same direction today as they did when the plant was designed, said Dr Luscher with some exasperation.

"Sir John also said not to forget that the plant is to be built in China, which is irrelevant," said Mr Luscher.

If the plant was located in the northwest, "it would be better from the point of view of fallout." If there was an accident, fallout would go onto Macau and Guangzhou less populated areas than Hongkong "with low level buildings."

High rises trap radiation, he ex-

plained. Also, mountains in the northwest would help stop the radiation from moving towards Hongkong.

It would, of course, be easier to evacuate Macau and Guangzhou than Hongkong, he pointed out.

The water currents from the northwestern waters, however, flow towards Hongkong which is one reason not to relocate the plant in the northwest, but in case of an accident, most radiation is passed into the air, he said.

Dr Luscher favours nuclear energy in part because it creates less air pollution than most other forms of energy, but he added that he wants more information about the Chernobyl accident which he described as "bad, very bad."

Environmental Specialist Interviewed

Hong Kong HONGKONG STANDARD in English 2 Jun 86 p 1

[Article by Yiu-ming]

[Text]

A NUCLEAR accident at Daya Bay between February and April would create a radioactive cloud that could hang almost stationary over Hongkong for weeks, according to a university lecturer.

Assuming normal weather patterns for that time of year, it would take the cloud only two to three hours to travel the 50 kilometres from Daya Bay to Hongkong, says the lecturer, Dr Kot Sec-chun, of the Faculty of Mechanical Engineering at the University of Hongkong.

Dr Kot says from the standpoint of Hongkong, there could not be a worse location than Daya Bay to build the billion-dollar nuclear power plant.

Dr Kot told *The Standard* in an interview yesterday that atmospheric conditions here are quite stable between February and April and this would tend to keep the cloud over the territory once it was dispersed from Daya Bay.

Dr Kot criticised the Hongkong Government for ignoring the pollution impacts of the power plant.

He said these should have been thoroughly examined before the construction site was chosen.

"The authorities concerned would have to collect at least one year of meteorological data in order to project various scenarios of radioactive diffusions to Hongkong as results of possible leakages of various degrees," he said.

Dr Kot, who describes himself as an environmentalist, stresses the importance of preparing for the worst.

"A Chernobyl-style accident seems unlikely to happen, but hazard analysis has to deal with the risks involved in the worst case that is possible," he said.

Dr Kot concedes the French design of the nuclear plant to be installed at Daya Bay is safer than American plants but nobody in the engineering field would guarantee the plant to be accident-free.

He explained there is no way of guaranteeing that a nuclear plant will automatically shut down if the system fails. In a major core meltdown, the core cannot cool itself down, it has to be done by other means.

Engineers can only guarantee engineering safety, not inherent safety, by setting up other systems to take over when there is a failure, he said.

But he warned these double-check systems are themselves fallible which

had been shown by the Three-Mile Island and Chernobyl incidents resulting in the traumatic core meltdown.

"For a higher degree of safety, the plant could have a multiple-check system installed but if more systems are to be prepared, the higher will be the production costs," he said.

"The degree of safety would have to be traded off with the investment costs or profitability of the project," he said.

Dr Kot feels the Hongkong Government has been reluctant to disclose information on the power plant for public scrutiny.

The secrecy is not justified as it is not a business to be handled by experts only but a common concern of Hongkong people, he said.

He favours the idea of holding a public hearing on the nuclear power plant before a final ruling is given on its construction.

The pros and cons would be presented in various arguments in the public hearing with adequate information to be provided by the power company, he said.

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CSO: 5150/0124

PEOPLE'S REPUBLIC OF CHINA

ENVIRONMENTALISTS EXPRESS CONCERN OVER DAYA BAY'S REACTORS

HK190317 Hong Kong HONG KONG STANDARD in English 19 Jun 86 p 4

[Report by Katherine Saltzstein]

[Text] A report by the U.S. Congress on nuclear power has shown that the type of plant to be built at Daya Bay, just north of Hong Kong, has many unsafe features, according to environmentalists.

The conclusions in the report were ambiguous but one thing was clear: the nuclear industry is young and many problems remain unsolved.

The report, which was published in February, 1984, was commissioned by Senate and House of Representatives committees. Among the project staff were engineers, scientists and university professors.

Mr Fung Chi-wood, a member of the Joint Conference for Shelving the Daya Bay Nuclear Plant, yesterday said he recently received a copy of the report from friends.

While details of plans for the Daya Bay plant are unknown, Mr Fung said information released indicated that it will be a pressurized water reactor.

According to the report, two-thirds of the reactors operating in the U.S. are pressurized water reactors, which have "good safety and reliability records."

However, "doubts linger about both the safety and reliability" of the light water reactors which, said Mr Fung, include pressurized water reactors.

The report said the design could be improved on or different types of reactors could be used to restore confidence in the nuclear industry.

Two widely-publicized accidents, one at Three Mile Island and the other at Browns Ferry, "underscore the potential for a catastrophic accident."

Safety concerns arise from the possibility of human error and malfunctioning of various components of the plants, the report continued.

Among the major safety problems with the water-cooled reactors is their potential to crack the reactor vessel, especially in older reactors, said the report.

It also said the complexity of the reactors could contribute to accidents and asked if "a similar but equally safe reactor (could) be designed."

"The design of the light water reactor has developed in a patchwork fashion and there are still a number of unresolved safety issues," the report said.

It listed several recommendations to make the light water reactor safer and stated that new designs are now being developed. It also outlined other types of reactors considered safer than the light water reactor type.

"Despite the less than perfect record of the light water reactor, many in the industry are reluctant to abandon it. They argue that they have made appreciable progress along the learning curve that would have to be repeated with an alternative reactor concept."

In a related development, Mr Fung said the Joint Conference is to lobby members of the Basic Law Consultative Committee because of their close working relationship with the Chinese authorities and because members have a strong interest in Hong Kong's future.

The conference has collected 75,000 signatures of those opposed to the construction of the plant, said Mr Fung. It hopes to gather 500,000 signatures by the end of August.

Mr Fung also said the conference planned to invite British experts and Hong Kong's new financial secretary, Mr Piers Jacobs, to take part in a seminar on nuclear energy.

/9274
CSO: 4010/60

PEOPLE'S REPUBLIC OF CHINA

HONG KONG PAPER SAYS 24,000 'THREATENED' BY DAYA BAY

HK290205

[Editorial report] The Hong Kong SUNDAY STANDARD in English on 29 June carries a series of articles related to the construction of the Daya Bay nuclear power station near Hong Kong. A 400 word page 1 report headlined "24,000 Face Death If Daya Bay Goes" predicts 24,000 people would face almost certain death should there be any disaster at the Daya Bay nuclear power station. They all live within a 10 km radius of the plant, the fallout zone in which Anglo-French experts glibbly assured the legislative councillors any radioactive emission would be contained." The paper says it would be PRC villagers and residents of rural townships who would die if there were an accident at the plant. The front page article includes a map showing the towns falling within the 10 km radius. Pages 6 and 7 are devoted exclusively to articles on the Daya Bay nuclear plant. A 1,200 word page 6 report headlined "Where Hong Kong Sits If Things Go Horribly Wrong" begins by asking the question "who and what will be affected should the territory be engulfed in a fallout cloud?" The article goes on to say:

"Nobody--China Light and Power, the construction engineers, the officials of Hong Kong and China or the environmentalists--can tell us what will happen if there is a 'mishap' of any magnitude."

"The simple truth is that they do not know."

"Statements attesting the safety of the plant and its operations, and the likelihood that if any disaster did occur Hong Kong would remain untouched, are no more than pious words. There has been no assessment of any disaster scenario like that which took place at Chernobyl in the Soviet Union on 26 April this year. Or at least none which any of the parties are prepared to make public for independent scrutiny. The inference is obvious. The Hong Kong government has ordered an assessment--to be completed next year."

"Complex mathematical models which will enable the Government to assess the risk of normal operation and the course of any cloud of radio-nuclides are now being developed by British nuclear scientists at Harwell."

A 350 word report on page 6 headlined "Shenzhen People Keep Quiet About Their Fears" says:

"In a recent Shenzhen Municipal Government meeting, some officials asked if there were any contingency plans for nuclear plant accidents, the SUNDAY STANDARD has learnt."

"The answer was 'No.' But it was promised in the meeting, held in the middle of this month, that safety measures would be strictly imposed."

"Some officials in Shenzhen expressed doubts, because they think there is a possibility of accidents. If there were any accident, Shenzhen people would suffer."

"Another Shenzhen official made it very clear that he opposed the Daya Bay project. If I were in the leadership, I would move the plant to some distant location with a sparse population. Daya Bay is too close to settlements; Shenzhen has a population of 400,000," he said.

"Although the information supplied so far is that the plant in Daya Bay will be different in design from that of Chernobyl, nuclear technology is a new area in China. Careful research should be conducted. Otherwise, it could be as dangerous as playing with tigers," he added.

"Asked whether China was already 'riding the tiger' and found it difficult to change her mind, the official smiled but did not give a direct answer."

"If other countries can do it, China should try too. Moreover, judging from her long-term needs, China has to develop nuclear power," he said.

"He believes that China will not choose another site for the nuclear plant as Daya Bay has a good geographical setting."

A 550 word report on page 7 under the heading "Concern But No Complaints" cites a senior Shenzhen environmental protection official who says:

"It is natural for Shenzhen people to have the same fear as Hong Kong people because much has been reported in the mass media," said Mr Chen Tangyi, director of the Shenzhen Municipality's Environmental Protection Office.

"Though he knows some people are afraid of the plant, he has so far received no formal complaints."

"A senior official of the Guangdong Nuclear Power Joint Venture Company (GNPJVC), who preferred not to be named, said he began to have doubts about the safety of the plant after the Chernobyl accident."

"However, a Communist Party member who has been in Shenzhen for three years said he simply did not worry about the safety aspects."

"This is a project launched by the Central (Government); there is nothing we can do even if we are worried," he said. "We cannot move away from Shenzhen, just in case of a possible accident," he added.

"Though the nuclear plant has brought worries, it has also brought more cooperation between environmental protection officials of Hong Kong and Shenzhen."

"The two sides have to keep in close touch from now on, to exchange information on monitoring, to ensure the safety of the nuclear plant," said Mr Chen. His department will play a part in monitoring the construction of the plant.

"After the Chernobyl accident, we had a meeting with the Hong Kong Environmental Protection Agency. Both sides expressed the desire to exchange information."

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CSO: 5100/9

PEOPLE'S REPUBLIC OF CHINA

HONG KONG OPPOSITION TO DAYA BAY SAID MOUNTING

HK010408 Hong Kong SOUTH CHINA MORNING POST in English 1 Jul 86 p 11

[Text] It began as a muted rumble of discontent by a small group of agitators, but by this week the opposition to the Daya Bay plant had become a well-orchestrated gesture of defiance.

Far from being the loose alliance of seasoned environmentalists and prominent activists who set out originally to question the nuclear plan, the opposition movement has now reached a level of support rarely seen in usually apathetic Hong Kong.

The environmentalists are still here, but they've been joined by academics, students, union leaders and even a large slice of the Legislative Council, the Government's "lower house." Together they are openly challenging the Government to prove that their fears are unjustified: to provide concrete assurances that there is no potential danger from siting a nuclear power plant a mere 70 km from Hong Kong.

The involvement of a number of eminent scientists has forced the Government to take the protesters seriously. In most cases the scientists object to the site's proximity to Hong Kong rather than to the project itself. Among these is Professor Peter Fung of the Physics Department at Hong Kong University, who said this week: "Speaking scientifically, the project should go ahead, but the choice of site (at Daya Bay) should be reconsidered. "To the best of my knowledge, no nuclear power plant of this size has been built so near to a population of five-and-a-half million (in any part of the world.)"

He said that human error was blamed for most nuclear leaks, but the potential causes of accidents at nuclear plants could not be well documented simply because this form of power was so new. With this in mind, safety measures should be the first priority with any proposed reactor.

Prof Fung said that given the close proximity of Daya Bay and the social conditions existing in the territory, Hong Kong people had good reason for objecting to Daya Bay. "I think their reactions will affect the prosperity and stability of Hong Kong. And I would hate to see all the years of hard work and all the political endeavours go down the drain because of the proposed Daya Bay nuclear power plant."

He accepted that the French pressurised water reactor system, now in widespread use throughout the world, would be a comparatively safer form of power plant than the older Chernobyl plant, which did not even include the concrete containment wall now standard in later designs.

"But due to human error, accidents do happen. Even if a very mild leakage occurs at the proposed Daya Bay plant, there is no proper management so far as to how Hong Kong people can be evacuated." He suggested that the solution would be for China to move the plant's location to a more remote area.

Much of the local criticism has been levelled at China Light and Power (CLP), which will be buying 70 percent of the electricity produced by Daya Bay.

Friends of the Earth (FOE), one of the main groups coordinating the opposition, yesterday cited what it claimed was the power company's poor safety record at its own conventionally-powered plants. The environmental group said in a strongly-worded statement that there had been two major accidents at CLP plants within the past two years.

FOE listed the two accidents as the serious blackout that hit Hong Kong in March 1984 and the shutdown of the Castle Peak B generator in April this year, which caused damage estimated at more than \$2 million.

The Friends of the Earth commented; "Nuclear technology is far more complex than conventional technology, and cannot be made accident-proof." It pointed out that Framatone, the French firm providing the Daya Bay reactors, had its own history of nuclear mishaps.

One of the firm's most recently-completed plants, at Koeberg, in South Africa, had been shut down in February last year, less than 12 months after it was commissioned, when cracks were found in steel piping.

FOE dismissed suggestions that a Chernobyl type of accident could not happen in the more advanced pressurised water reactor (PWR) because of differences in design--including the use of a concrete containment wall. It noted that the small hydrogen explosion at America's Three Mile Island plant in 1979 had occurred in a PWR.

Meanwhile, tourist groups are concerned that visitors to Hong Kong might be deterred by the close proximity of the plant.

The chairman of the International Chinese Tourist Association Ltd (ICTA), Mr Peter Cheung, pointed out that the Chernobyl disaster had led to a massive drop in the number of tourists visiting Europe.

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CSO: 5100/9

CANADA

KANATA FIRM DEVELOPS BADGE-SIZE RADIATION DETECTOR

Ottawa THE CITIZEN in English 17 Jun 86 p B4

[Article by Sylvia Vincent]

[Text]

The human toll inflicted by radiation at Chernobyl could have been greatly reduced had a badge-sized radiation detector developed by a Kanata firm been in use.

In fact, Ian Thomson, 44, and Torben Nielsen, 39, partners in Thomson & Nielsen Electronics Ltd., envision a time when every house close to a nuclear reactor could be equipped with a cheap nuclear alarm to warn of a reactor leak.

Moreover, every nuclear plant worker and uranium miner could wear a badge or carry a calculator-sized device that would immediately warn of dangerous radiation exposure levels or the presence of deadly radon gas.

"Radiation is an unseen hazard," said Thomson. "You don't know you are being exposed until it is too late. With a detector to show immediately the degree of exposure, we could seek early medical attention or evacuate."

Thomson and Nielsen produce dosimeters: monitors to measure various types of radiation. They have sold hundreds of the sensors to U.S. and European research organizations who are developing radiation detection systems.

The former scientists with the European Space Agency in Holland and Mitel Corp. in Kanata started their Carling Avenue electronics firm in 1984.

They now employ six and had sales of about \$250,000 over the last year.

Thomson said the possibilities for personalized radiation detection are enormous, especially in the light of recent nuclear accidents.

According to Thomson, studies done before and after the Three Mile Island accident in 1979 show authorities knew that if a reactor melted down, people within 16 kilometres of the site would be exposed, over several days, to a level of radiation that could be dangerous.

"Somebody has to make a decision to evacuate or not. With this device, the individual could have made that decision," he said.

In addition, Thomson said radon gas has been detected in the basements of houses throughout the United States, especially Pennsylvania, and also in Elliott Lake, Ont., where uranium mining is carried out.

For both the detection of radiation and radioactive gas, current devices are not portable enough or cheap enough to be issued to everyone.

The device developed by Thomson and Nielsen now sells for about \$100 but if the market develops it could sell for as little as \$10.

Using a silicon chip a millimetre square, the device absorbs

radiation and changes the voltage that is measured by passing it through the silicon chip. The chip displays an instant readout of the amount of radiation.

With funding from the federal department of Energy, Mines and Resources, Thomson and Neilsen have also produced a prototype for detecting radon gas that is far superior to technology now available.

Current radon detection methods use a small piece of plastic, the size of a drinking glass base, which is treated chemically for reading. It is left in one location, such as a basement, for several weeks then removed by the manufacturer to be checked. However,

obtaining results can take up to three months.

Thomson and Neilsen's calculator-sized device samples the air with a pump and so-called daughter products of radon are deposited on a filter. The radioactive emissions are then detected by silicon sensors, recorded and results are given instantly on a digital display.

Currently, the lion's share of the pair's business comes from contracts with the Energy department for research and development but in the wake of the recent Chernobyl accident, Thomson sees the market for radiation detection devices taking off.

/9317
CSO: 5120/44

CANADA

REACTOR SHUTDOWN AT BRUCE STATION ORDERED EXTENDED

Toronto THE TORONTO STAR in English 16 Jun 86 p C23

[Article by Allan Thompson]

[Text]

Weakness in a metal pressure tube caused the March 28 accident that shut down a reactor at the Bruce nuclear power station near Kincardine, a Hydro spokesman says.

Dave Stevens says the finding means that Unit 2 will be out of operation indefinitely. The reactor was hoped to be ready to go by Saturday.

At last estimate, the shutdown was going to cost Hydro \$5 million in replacement coal-fired power and \$5 million to get the reactor working again. Those figures will probably rise with the extended shutdown, but Stevens said he could not estimate the additional cost.

Tests following a similar accident at the Pickering station last year led to the complete retubing of two reactors, a three-year project expected to cost about \$3 billion.

Hydro must recover a missing fuel rod and examine 14 pressure tubes that could suffer the same weakness, tests

have shown. Hydro is checking those tubes now.

Engineers originally believed the pressure tube ruptured because of a mistake in the way it was installed, Stevens said.

But tests on the faulty pressure tube, done at the Chalk River Nuclear Laboratory, have shown that weakness in the tube's material caused it to rupture and release eight radioactive fuel rods into the reactor.

Hydro has since recovered all but one of the pencil-sized fuel rods.

Each pressure tube holds 13 fuel bundles laid end to end. The bundles contain 37 of the pencil-like fuel rods that hold pellets of uranium fuel. The pressure tube, with its surrounding assembly, is called a fuel channel and there are 480 such channels in a reactor.

The other tubes now being examined came from the same batch as the faulty tube.

Stevens said a new pressure tube has been installed.

/9317
CSO: 5120/44

CANADA

POR HOPE AREA RESIDENTS OPPOSE NUCLEAR DUMP SITE PLAN

Toronto THE TORONTO STAR in English 20 Jun 86 p A7

[Text]

OTTAWA (Staff) — Prime Minister Brian Mulroney has broken his election promise to Port Hope area residents that a permanent nuclear waste dump would not be located near their community, a local citizens' group has charged.

Plans for a low-level radioactive waste site in their area — about 50 kilometres (31 miles) east of Toronto — are unacceptable, the residents said at a press conference in Ottawa yesterday.

They say the facility, proposed by the Crown-owned nuclear company Eldorado Resources Ltd., will threaten the health of not only residents of the immediate area, but also that of millions of residents in Toronto, and in much of Southern Ontario, whose main source of drinking water is Lake Ontario.

Instead there should be "an impartial body set up to find a permanent waste disposal site far removed from population centres and Lake Ontario," said Robert Sculthorpe, a spokesman for the residents.

The residents said Mulroney supported their views in a letter he sent to them in August, 1984 — a week before he was elected Prime Minister.

Should be removed

"All (low-level radioactive) waste should be removed from major population areas and kept well away from major population centres such as Lake Ontario," Mulroney said.

"The federal government must accept at least partial responsibility and provide the leadership."

Earlier this year, after Ottawa ordered Eldorado to find a permanent site for its radioactive waste, the company proposed sites in the Port Hope area, where it already has 1 million tonnes of such waste.

Eldorado mines and processes uranium for use in nuclear reactors.

The government is setting up environmental assessment hearings that will look at Eldorado's plans, but "there are a number of issues which cannot be addressed by hearings," Sculthorpe said.

The residents fear that a nuclear dump in their area will be used to store radioactive wastes shipped from other parts of Canada.

"There is no fixed answer to that question," said Mines Minister Bob Layton in April, when he ordered Eldorado to find a dump site.

One Eldorado proposal is to bury wastes in underground limestone caverns near Wesleyville, just west of Port Hope and three kilometres (two miles) from the lake. The government has also told Eldorado to find a second dump site north of Wesleyville.

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CSO: 5120/44

ARGENTINA

BRIEFS

COBALT-60 PLANT PLANNED--Buenos Aires, 1 Jun (TELAM)--A radioisotope plant will be built at the nuclear power plant in Embalse Rio Tercero, southern Cordoba. The radioisotopes will be for medical use. Within 5 years, 1,000 people will be involved in the construction of the radioisotopes plant which requires a \$36.5-million investment. The funds will come from CNEA [National Commission for Atomic Energy] funds. [Excerpts] [Buenos Aires TELAM in Spanish 1356 GMT 1 Jun 86 PY]/12766

CSO: 5100/2087

BRAZIL

ENVIRONMENTALISTS TO REQUEST TERMINATION OF NUCLEAR PROGRAM

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Jun 86 p 24

[Text] A suit will be filed to demand termination of the Brazilian Nuclear Program in the first part of the second half of this year. The suit will be based on the federal law protecting the environment. This information was announced yesterday in Campinas by Atty Fabio Feldman, a member of OIKOS, an environmentalist organization, and the OAB-Sao Paulo Environmental Commission, during a speech on nuclear proliferation and nuclear accidents, sponsored by groups composed of Unicamp students, professors and officials.

According to Feldman, several ecological organizations supported by OAB are in contact with nuclear energy scientists and technicians in order to put together the resources necessary to draw up the suit. Atty Feldman believes that even if the plants are not temporarily shut down, "it would give us access to certain information which would make the Brazilian Nuclear Program less vague." This information would include, for example, sections of the agreement reached between Brazil and Germany.

As far as Feldman is concerned, after the Chernobyl accident in the Soviet Union, "the further development of nuclear projects cannot be justified anywhere in the world." In Feldman's opinion, what has become clear after Chernobyl is that "no plant is 100% safe." In the case of Brazil, he further emphasized that "civil defense plans for Angra dos Reis do not even exist" and that a nuclear accident there would affect "a huge area with 32 million people in the country's largest industrial and commercial area."

Professor Luiz Carlos Menezes of the University of Sao Paulo, director of the Brazilian Physics Society, also advocates termination of the National Nuclear Program, which he considers not only unsafe but also unnecessary. "It is absurd in every sense," said the physicist, pointing out that "this program should be terminated once and for all, or we can stop claiming that we are living in a democracy."

Professor Menezes said that the first step toward termination should involve "the removal of officials from the energy sector who have survived from the authoritarian regime and are making shameless deals among themselves." He also urged mobilizing the public to include provisions in the new constitution that would "establish restraints on the arbitrariness with which decisions are made in the energy sector."

Prof Rogerio Cezar Cerqueira Leite of the Unicamp Physics Institute said that "it is essential that the Brazilian government make an unbiased study of the nuclear program with participation by persons who are not directly involved in it."

Cerqueira Leite is a member of the commission appointed by Pres Sarney to determine what measures should be taken in the wake of the Chernobyl accident. The commission concluded that all construction at new plants should be suspended for 3 years. This is a short period of time, but according to Cerqueira Leite, "it will at least make it possible to review reactor safety."

The Unicamp professor also believes that "there are inherent dangers in nuclear power apart from plant safety systems." According to the physicist, the Chernobyl reactor was quite safe, but that did not prevent the accident.

8844
CSO: 5100/2084

BRAZIL

EMFA HEAD CITES NO DESIRE TO HAVE ATOMIC BOMB

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Jun 86 p 4

[Text] Adm Jose Maria do Amaral, minister and EMFA head, said yesterday in Sao Jose dos Campos that he disagrees with the position taken by the Provisional Constitutional Commission on the role of the Armed Forces. "The current constitutional provision, which has been unchanged since the days of the Empire, is fine and should not be changed," he said. In Porto Alegre the head of the Southern Military Command (formerly the Third Army), Gen Paulo Campos Paiva, spoke out against the provision as approved by the Commission, which does not entrust internal security to the military.

"The Constitution must reflect what the public wants," Adm Amaral added, admitting that some powers do not have to be stipulated in the Constitution. He pointed out that this is the case in the United States. "The United States is a great democracy, but if an internal security problem arises and the government deems it necessary to call on the Armed Forces, it does so," he pointed out. "This is true in France, also."

The EMFA head believes that the country is in the process of deliberating principles which will be incorporated into the future Constitution. "Therefore, everyone must express his opinion in order to reach a consensus," he said, "including the recommendations made by the Arinos commission. According to Adm Amaral, "the military wants a Constitution which reflects the Brazil of the future, and not the Brazil of the past or the Brazil of today, but Brazil two decades from now."

In conversation with reporters, he also answered a question on the possibility of building nuclear weapons. "We have no desire for the atomic bomb," he said, "but neither do we want to be denied nuclear energy technology." In his view, the country needs "to keep up with new technological developments in all areas."

He made it clear that this is a political decision which has not yet been taken by the government. "I think Brazil has a right to nuclear technology," he concluded, "because its application in several areas would prevent our becoming dependent. At some point, this technology might have not only a civil application, but also a military application."

Gen Paiva, of the Southern Military Command, emphasizing that he was speaking as a private citizen, remarked that it was strange that the Arinos commission recommended that internal security should be entrusted to the civil police. "If the civil police is unable to guarantee internal security, who would? The Armed Forces, obviously," he said, noting that even if the recommendation is approved, "nothing would change."

8844
CSO: 5100/2084

BRAZIL

CIVIL DEFENSE PLAN FOR ANGRA DOS REIS EXISTS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Jun 86 p 13

[Text] The Civil Defense Secretariat of the Interior Ministry has a plan for evacuating Angra dos Reis in case of a nuclear accident and is already educating the public about it. According to Antonio Celso Guimaraes Mendes, under-secretary for civil defense, the campaign has been under way in the area since Tuesday, but on a small scale due to lack of funds, because SEPLAN has not released any of the Cz\$ 20 million allocation requested in April of this year to finance the campaign and the training and upgrading of the Municipal Civil Defense Commission.

According to the undersecretary, this plan has been in existence since 1981 and was drawn up under instructions from the National Nuclear Energy Commission, but had been kept in mothballs until November of 1985, as have all nuclear projects in the country. Even though it became public knowledge 6 months ago, the plan has not been put into effect due to lack of funding. In spite of this, said the undersecretary, Civil Defense decided to kick off the public education phase with materials that could be put together with funds that were already available: 55,000 copies of basic instructions and over 20,000 pamphlets for children containing more detailed information and listing gathering points in case of a nuclear accident and a similar number of pamphlets for adults. Another brochure was also distributed, containing information on radiation and listing the locations where people should gather in case of a serious accident for transportation to the campus of the Universidade Rural do Rio de Janeiro by bus from Usina and Rio.

Col Jose Maria Nova da Costa, Civil Defense secretary, Tito Gobbato, Civil Defense representative on the Commission for Coordinating Protection under the Brazilian Nuclear Program (COPRON), Elizabeth Tavares de Souza, Civil Defense communications secretary, Maria Helena, operations assistant, and 20 staff members from the Rio de Janeiro Civil Defense office will remain in the area until the 15th of this month to educate the public. They will be giving lectures for schools, labor unions and other groups, distributing pamphlets and explanatory instructions, and explaining the program on local radio stations. The television campaign is not being launched because Civil Defense has no funding for it.

8844
CSO: 5100/2084

EGYPT

NUCLEAR-POWERED SHIPS IN CANAL TO BE STUDIED

Cairo MENA in Arabic 2145 GMT 2 Jul 86

[Text]

Cairo, 2 Jul (MENA) — President Husni Mubarak has stated that Egypt is currently studying all the necessary measures and regulations which pertain to the passage of nuclear-powered ships through the Suez Canal. This step, the president added, will enable Egypt to establish principles which can be applied to all ships that use this vital international waterway.

President Mubarak made this statement in an interview with *Al-Ahram*, which the paper will publish in its entirety on Friday. President Mubarak affirmed that there are several extremely important aspects which must be taken into consideration before Egypt can define its position on allowing the passage of nuclear-powered ships through the canal.

President Mubarak enumerated these essential aspects as follows:

First, Egyptian citizens who live along the canal's banks must be protected from any danger to which they might be exposed as a result of the passage of nuclear-powered ships, and measures that would guarantee this must be taken;

Second, the safety of the canal itself as an international waterway which is used by all countries and which serves international trade and community must be measured;

Third, it must be guaranteed that Egypt would obtain the appropriate compensation equivalent to the Suez Canal's revenues

should the canal suffer any damage or should accidents occur and obstruct movement through it as a result of the passage of nuclear-powered ships;

Fourth, appropriate fees in line with the degree of danger inherent in such a ship must be defined; and

Fifth, firm principles that will be applied to all countries without exception must be established, particularly in light of the fact that many countries own nuclear-powered ships. If one country is allowed to have its ships pass through the canal, then others will request the same treatment.

Although certain countries which have requested permission to have their nuclear-powered ships pass through the canal have affirmed these ships are equipped with the greatest degree of nuclear safety possible, President Mubarak said that Egypt must still take precautionary measures to ensure the safety of its citizens and the canal. Egypt must also take all unforeseeable contingencies into consideration. President Mubarak affirmed that the aspects of the issue which Egypt has defined are in no way meant to harm its relations with any country or to curtail the extent of these relations. As is known, the United States has asked permission for the nuclear-powered *Enterprise* to pass through the Suez Canal. The Egyptian authorities have requested time to study this issue in general.

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CSO: 5100/4613

EGYPT

CALL FOR NUCLEAR CONTROLS; LICENSES ISSUED

Cairo THE EGYPTIAN GAZETTE in English 2 Jun 86 p 2

[Text] Chairman of the Nuclear Safety Agency, Dr Fawzi Hammad, called for the formation of one unified government authority for control over radioactive sources and the setting up of an independent agency to be entrusted with the task of issuing all licences for nuclear establishments and radioactive sources.

The agency will also carry out facility inspections and qualify technical staff to run such facilities and thus help to avert risks of radioactive leaks. Experts of the agency will have control over radioactivity in hospitals, universities, factories and research laboratories in order to avoid a recurrence of the incident that took place recently in Cairo University.

Dr Hammad said it is time the existing nuclear safety law was changed in accordance with the latest developments in the field. The present law was issued 26 years ago.

The present law, he said, makes no reference to protecting the environment against radioactive pollution or to measures to be adopted in emergency. Most countries have resorted to amending their laws to overcome this drawback.

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CSO: 5100/4615

INDIA

THREE NEW HEAVY WATER PLANTS BEING SET UP

New Delhi PATRIOT in English 18 Jun 86 p 5

[Text]

Taking into account the profile of programme for production of 10,000 MW nuclear power by the year 2000, three more heavy water plants are being set up, reports IPA.

The first of these three new plants is to be set up at Hazira, identical with the one at Thal-Vaishet. The Thal project in turn is similar to the process at the Tuticorin heavy water plant, without seeking any design or engineering help from foreign sources.

Two more heavy water plants would be required for meeting the nuclear power programme profile — one will be based on ammonia hydrogen exchange and the other based on hydrogen sulphide water exchange. The completion of the first of these two plants is proposed by the year 1994-95, while the second plant will be needed to be in production by the year 2001.

Meanwhile, significant upgrading of production in the five heavy water plants now in operation in the country has been achieved as a result of modifications and improvements effected in their working.

Major modifications have been brought about in the Baroda and Tuticorin plants based on the findings of a committee constituted in 1982-83 to look into the performance of the two heavy water plants and to identify the causes for low production of the two plants.

The committee's recommendations, which were accepted by the Atomic Energy Commission, were of short-term as well as long-term nature.

The short-term modifications have already been completed, while the long-term modifications, having longer gestation periods, are in different stages of implementation. The two plants will reach their full potential by 1987-88.

Out of the five heavy water plants now in operation in the country at Nangal, Baroda, Tuticorin, Kota and Talcher, the last four faced many technological problems on account of the new technologies they adopted. It was found as early as 1982 that many of the parameters assumed for design needed review. It was in this context that the board of management of heavy water projects constituted a special committee in 1982-83 to thoroughly examine the working of the Baroda and Tuticorin plants and to assess the maximum possible production that can be realised from these plants after suitable modifications.

With continuous improvements based on actual experience as well as the short-term modifications recommended by the expert committee, it has been possible to improve production in the Baroda and Tuticorin plants significantly over the previous years. Optimum production will be achieved in 1987-88 when the modifications are completed.

What is more, in the process of making these modifications, the technology has been fully absorbed and it has been possible to set up a two-stream heavy water plant at Thal-Vaishet based on a process similar to that used at Tuticorin, based on indig-

enous design. The complicated equipment for the exchange towers have been fabricated in India according to indigenous design drawings.

The work at Thal is nearing completion and it is expected that heavy water will be produced on schedule in early 1987. There has also been a significant saving in the cost of the project as against that originally sanctioned.

With regard to Kota, the capacity has been set at 85 tonnes a year keeping in view the lower stream of factor of 7200 hours of production as against 8000 hours assumed in the design. The production from Kota has also been attuned to the requirements of the Safety Review Committee as well as anticipated interruptions in the supply of steam when it is being drawn only from one nuclear reactor.

The performance at Kota has been very encouraging. While operating the

plant on parameters set by safety requirements, the production output has been slightly above the design expectation for these parameters. The operation of the plant has been continuous and sustained during the period steam was available on a continuous basis from the RAPS reactor.

Realising that the availability of steam would be a constraint on production, a proposal is under consideration for setting up a captive steam generation plant to ensure high steam factor. It is expected that this steam generation plant will be in position in two years when the plant capacity will react its full potential, that is, by the year 1988-89.

The success of the absorption of this technology has been availed of in the setting up of the country's seventh heavy water project at Manuguru which will have its own captive steam and power plants.

/9317
CSO: 5150/0130

INDIA

SELF-SUFFICIENCY IN HEAVY WATER PRODUCTION EXPECTED

Calcutta THE STATESMAN in English 9 Jun 86 p 9

[Text]

BOMBAY, June 8.—India should very soon be self-sufficient in the production of heavy water which is required as a moderator in nuclear reactors and the inadequate production of which so far hampered nuclear power generation.

Mr N. Srinivasan, member of the Atomic Energy Commission who is in charge of heavy water projects, said: "We will be able to meet the entire requirement of 13,000 tons for the projected generation of 10,000 MW of nuclear electric power by 2000 A.D. And, now that we can put up bigger plants, we will require only two or three more new plants to meet that requirement".

In 1980 when Mr Srinivasan was asked to coordinate the heavy water programme, the existing plants had a capacity of only between 50 and 100 tons. And as many as seven more plants were thought would be necessary.

He said the knowhow for the hydrogen sulphide-steam exchange process, the only commercially proven one at that time, was not just available to India. That technology was, however, indigenously developed and what was considered to be a large plant at that time was put up at Kota.

ADVANTAGE

That compulsion has been to India's advantage, according to Mr Srinivasan, helping to remove several of the early snags. For instance, it used to take 20 days to restart production. In the Kota plant following a shut-down caused by a power failure. In the event of frequent power failures the production was negligible. "Now we

get back to production on the third day, because, in the light of experience, we have modified our system. We have come a long way in this technology during the past decade", he said.

"We now do in six years in this entire technology what once would take 10 years", Mr Srinivasan said. "You may say that given the resources, we have the expertise to design, construct and operate heavy water plants on our own. We have come of age".

The Thal plant in Maharashtra has a capacity of 110 tons per year and the Manuguru plant in Andhra Pradesh, has a capacity of 185 tons. "Work on both is at an advanced stage and on schedule". Work on a third new plant at Hazira in Gujarat (110 tons) has started. The Thal plant should be in operation by early next year and the Manuguru plant by early 1988. "The capacity of these plant has been so standardized that we can always operate them at peak capacity", he said.

Of the existing ones—at Nangal (14 tons), Baroda (82 tons), Tutticorin (67 tons), Talcher (71 tons) and Kota (100 tons)—the one at Talcher is said to have an uncer-

tain future, "as long as nothing is done to improve the functioning of the fertilizer plant with which it is integrated", he said.

The performance of the rest has vastly improved, according to Mr Srinivasan. "The daily reports are encouraging".

The early problems of these plants were because of shut-downs in the fertilizer plants on which they depend for their feedstock which is synthesis gas. For one thing, the fertilizer plant's own capacity limited the amount of heavy water production. What was worse, any dislocation in the working of the fertilizer plant upset the fine balance, or state of equilibrium, between liquid and gas in the deuterium extraction process. And heavy water production is not something which can be switched off and on. It takes time to reach equilibrium after every interruption in operation.

Efforts are being made to overcome the dependence of heavy water production on fertilizer plants. "Initial experiments in that direction are successful", Mr Srinivasan said. "We are confident."

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CSO: 5150/0129

INDIA

BRIEFS

NUCLEAR PUMP MANUFACTURING--The State-owned Bharat Pumps and Compressors Ltd. will manufacture high-tech nuclear pumps in collaboration with Pompes Guinard of France, reports PTI. Mr V. Krishnan, managing director of the company told reporters today that an agreement to this effect had already been signed with the French Firm. These indigenously manufactured nuclear pumps would meet the requirements of the country's nuclear power stations and would help in achieving the generation capacity of 10,000 megawatts of nuclear power by the turn of the century, Mr Krishnan said. The pumps for the Rajasthan atomic power plants had been earlier imported as the country did not have the technology to manufacture the wide range of nuclear pumps. Mr Krishnan said Indian nuclear experts had designed the pumps and had got them passed by French scientists in accordance with international standards. He said initially the company would be spending Rs 2 crores in connection with the pumps project. This would include special testing facilities.
[Text][Calcutta THE STATESMAN in English 14 May 86 p 15]/12828

CSO: 5150/0127

ISRAEL

PUBLIC APATHY ENCOURAGES SECRECY IN NUCLEAR PROGRAM

Tel Aviv KOTERET RASHIT in Hebrew No 179, 7 May 86 pp 8-9, 43-45

[Article by Mikha'el Dek: "Israel's Silent Nuclear Connection"]

[Text] If the Israeli politicians, unlike the Russian politicians, are telling the truth, then this is not Kiev. Last Thursday, when Shim'on Peres was celebrating the Memuna in Dimona, he was looking for something nice to say to the residents. "I can assure you," he said, "that there is no danger from the Dimona reactor. You know it, because it is in your hands--the trustworthy hands of the residents of Dimona and the Negev. You work there."

The residents of Dimona applauded, of course. However, they do not know, nor can they know, just as the entire population of Israel does not know, what the dangers of running their reactor are. A sophisticated toy was built next to their homes and they do not know if it is lethal or to whom. Nor are they privy to every procedure or decision related to the transformation of Israel into a nuclear nation. Surrounding everything related to the nuclear issue in Israel there exists, between the authorities and the scientists, a bond of silence that does not allow the population at large to participate in decisions regarding its fate. But perhaps the problem lies with the public itself: The people do not want to know.

Blind admiration of everything related to technology and apathy toward scientific subjects is one wave encouraging the noose of silence. The second wave is the "Leave it to us" syndrome, the mystical shroud in which the Israeli nuclear community--a few hundred people who make their living in the field--wrap themselves. The third wave on the bandwagon of silence is the confusion of fields, between Israel's nuclear military capability, which is unclear, and all the rest of the knowledge related to exploiting the atom. "Nuclear" sounds like security, even when speaking about electricity. And everything related to security is holy and safe. The fourth wave is political: From Shim'on Peres to Yuval Ne'eman, everyone who worked secretly years ago to develop an Israeli nuclear strategy misses those big decisions.

"In Israel, there is total disregard for the public's intelligence," says Dr Eshel Ben-Ya'akov, from the physics department of Tel Aviv University. "The Ministry of Health checked samples of rain that fell in Israel over the last few days and refused to disclose in which areas radiation was localized, although, according to the ministry, the levels were well below the danger

level. Why can't the Ministry of Health publish the exact figures, i.e., these are the normal levels, this is the measurement in Israel, and let the people judge. Why should a clerk from the Ministry of Health tell the public: "You have nothing to worry about." When all of Europe is buzzing, failing to disclose information is an affront. The only country that behaved toward its citizens the way our government behaved toward us was Greece." "This is exactly the policy adopted toward Israel's acquisition of nuclear power plants. Nuclear scientists have no more tools for reaching a decision than the public. The fact that they do not reveal the whole truth borders on an attempt to guide and mislead public opinion by hiding some of the facts."

The power of a nuclear power plant for the production of electricity, of the kind Israel wants to buy, is approximately 100 times greater than the plant in Dimona and 1,000 times greater than the plant in Nahal-Shoreq. The price of this power plant could reach \$2 billion--a heavy price. In Israel, there has never been an open public debate on the question of Israel's need to be equipped with nuclear power stations. No one explained to the public what Israel's energy needs will be over the next few years, and no one explained the dangers of setting up another nuclear plant in Israel, or at least the risks. Under these conditions, it is not surprising that the Chernobyl incident popped the cork out of the bottle, and someone who wanted to do so would have to work very hard to push it back in. "Some of the fear comes from ignorance," says Professor Arnon Dar, head of the physics faculty at the Tekhnion in Haifa. "People wrongly relate the nuclear reactor to a nuclear bomb. In the case of Chernobyl, mass hysteria erupted encouraged by the media, mixing half truths with political opinions. The background for this was provided by the Soviet silence following the reactor incident, but it is difficult to draw parallels between the Soviet incident, where the safety measures were different and outmoded, and reactors in the West. The probability of such an incident in a location where there are appropriate safety measures and public control is very slim."

Professor Amnon Pazi, rector of the Hebrew University, finds that some of the uncertainty stems from the fact that in Israel people tend to mix up Israel's nuclear deterrence with nuclear advancement for public needs. One of the results is that no category of nuclear activity is discussed openly. "But the question of all questions is whether it is a wise move to buy a nuclear power plant for Israel."

The Dog and the Bone

In Israel, there is an official nuclear decision-making body. The head of this body is the prime minister. The body is called the Nuclear Energy Commission. Its main role is to advise the government on nuclear issues. From now on, in a dangerous combination of functions, the commission will begin, according to its official definition, to be the watchdog over the nuclear bone. One of the commission's roles is to move ahead on the issue of power plants in Israel. Another responsibility is to keep abreast of modern technological advances and their implementation in Israel.

Aside from its research activities, in recent years the commission has been increasingly involved in decisions on the country's economic and technological development.

According to Professor Dani'el 'Amit, head of the physics department of the Hebrew University the commission fills "a role diametrically opposed to what it should. In effect, the commission is an 'agent' of the nuclear power plant firms."

Due to the combination of consultation, advancement, control, implementation, and representation, the commission cannot perform a checks and balances function.

It should not be surprising, then, given this definition of roles, that the commission has an interest in not stirring up a nuclear controversy. Additionally, in the framework of its "national service," the Commission sees pacifying the public as one of its roles. A few hours after the incident at the Chernobyl plant was publicized, commission member Dr Dan Lital stood before the television cameras to reassure the public, this even before there was data on the severity of the incident.

A Question of Safety

In March 1979, a malfunction occurred at the nuclear plant on Three-Mile Island in Pennsylvania. The scientists needed 5 days to surmount the "chain of human errors" that threatened to turn into a tragedy. The danger was harnessed, but American television broadcaster Walter Cronkite defined those days as a turning point in the history of nuclear energy usage. The faith of the American public in its scientists cracked. A new era began. No, not only are the opportunities afforded by nuclear plants taken into account, but also the risks. "In Israel, the maximum danger should be taken into consideration, not the minimum risk," says Dr Ben-Ya'akov, and his opinion is not unique. Aside from safety problems, thought must also be given to problems of security--the physical protection of the plant and the area around it. The danger of an attack on the plant exists, and the solution required must be particularly foolproof. An attack on a conventional power plant does not drastically endanger the area surrounding it. It is also subject to reconstruction; it is just a question of cost. A massive attack--of the kind we in Israel have dubbed 'good hits'--on a nuclear plant takes it out of operation forever. Last week, we learned something about the harm that can befall the people from an explosion in a nuclear plant."

Everyone will gladly talk about safety problems. It is an important and a serious problem, almost too serious to leave it to the people. But there are public representatives dealing with the issue--the Commission on Nuclear Safety. The Commission does not decide whether Israel will buy a nuclear power plant, but it will set up safety standards. 'Amos Horev, who sat as head of the minister's energy commission for the investigation of nuclear power plants, does not oppose a public debate on the question, but he has faith in the control network. After all, the people handling this issue are not jackasses, they do take safety problems into consideration.

Professor Dar warns against drawing an analogy between the incident at the Chernobyl plant and the possibility of something similar occurring at a plant manufactured in the West. According to Dar, the licensing and control procedures are entirely different, and the Soviet nuclear plant was simply outdated.

Horev has faith in French technology: "The Russian plant cannot be compared to anything at all. Although we should not indulge in too much self-praise, I believe that man is capable of building safe systems. More than 70 percent of the plants in the world are based on Westinghouse technology and the French have a great deal of experience with them. They have built plants in populated areas and they even have an excess of nuclear electricity that they export to neighboring countries. They have built advanced control and protection systems, too."

How much the French have invested in control and protection systems is an open question, but even a zealous nuclearist like former science minister Professor Yuval Ne'eman, is not overly impressed with French safety measures. "France simply did not pay heed to all the waves made by Jane Fonda and others, and reached a point where most of its electricity is nuclear," he said. Ne'eman does not doubt that the plants need safety improvements, and the only possibility in his mind is underground plants. Professor 'Amit, on the other hand, has only a few words to say on the subject: "If the Russians are criminals, then the French are adding meaning to the word."

"There are countries in which one can give up a territory with a radius of 30 kilometers, such as around Chernobyl," says Professor Pazi. This area is contaminated now and will be neutralized over a period of years. Imagine such a situation in Israel."

Dr Ben-Ya'aqov addresses the issue more poignantly: "An attack on the plant is not a one-time occurrence; it is for generations. The effects will last for generations. A massive attack on the plant would exterminate the country. A large portion of the population will be busy being sick with cancer, and the other part--giving birth to defective children. You wonder about all the funds. But if they manage to attack the plant, that is it."

"Any attack on or significant accident in a nuclear plant will cause a heavy ecological disaster or will plunge the country into a radium disaster whose effects will be felt for generations to come. The decision to buy a nuclear plant carries a significance that will last for generations to come. This is part of an awareness of the quality of life and the environment that does not exist here," says Dr Ben-Ya'aqov. "We destroy what we have in the way of quality in the environment, and the incident at Chernobyl provides a good opportunity for checking house."

At the end of the fifties and the beginning of the sixties, a group was active in Israel organizing a desperate struggle on the subject of the need to turn Israel into a nuclear nation, and an even more futile struggle in an attempt to bring the question to a public debate. Around the time of the establishment of the plant in Dimona, there were those who tried to protest, among them members of the Atomic Energy Commission at the time. They were

motivated by the desire to demilitarize the Middle East from nuclear weapons. Today, one of the activists from that group, Yoram Nimrod, is demanding that information on everything that is going on in the nuclear field be brought to the public. In his opinion, there is no reason for secrecy, because it is enough for the Arabs to have doubts as to whether or not Israel has nuclear weapons. "The secrecy today is just against Israelis," he says. In Nimrod's eyes, the cloud that issued from Chernobyl is the best proof of the fact that the atom has no bounds, and that the proper solution is voluntary withdrawal and a gradual forefeiture of state control over environmental issues.

In Israel there has been no movement such as the anti-nuclear movements in Europe. "Everyone is just looking for his own personal out, through which he will be able to escape," says Knesset Member Ya'ir Tzaban. Dr Uri Merinov, director of the service for protecting the quality of the environment within the Ministry of the Interior, feels that this is due, among other things, to a reluctance to come out against an issue related to security, and also because of apathy toward environmental issues. He tells about a study conducted 10 years ago: 80 percent of the respondents were in favor of building a nuclear power plant. That same 80 percent, however, did not want the station to be near their place of residence. Perhaps this is the out referred to by Knesset Member Tzaban.

The Accomodating Sellers

Perhaps the apathy of the Israeli public toward the use of nuclear reactors can also be explained by the fact that the question simply did not hold water until recently. For many years, there was no one who would sell Israel a nuclear reactor. Israel refused to sign a nuclear weapons armistice so as not to place her reactors in Nahal-Shoreq and Dimona under the scrutiny of any outside power. Under these conditions, the United States refused to sell. But France started sending out feelers, and we sent more feelers back. The negotiations advanced last week, according to Yuval Ne'eman, who, in an interview with Qol Israel said that during his tenure as minister of science, an agreement had been reached to sell a reactor to Israel. In today's very depressed market, the sale of a reactor would constitute a positive economic shot in the arm to any economy.

Others on the world market are also interested in selling nuclear reactors, such as the Tennessee Valley Authority in the United States and the Electric Company of California. They want to sell in order to reimburse themselves for part of their investments which went down the drain. The firms' losses occurred after the federal government in the United States passed stricter licensing procedures and required additional safety measures causing the cost of nuclear electricity to become prohibitive. No nuclear plant has been built in the United States since 1978, whereas previously, 10 to 20 had been built a year.

The American nuclear industry, which in the 1950's and 1960s predicted great growth and which, during the oil embargo of the early 1970s, was America's one hope, is sinking rapidly. What the fear of disaster did not do, the expensive safety measures and declining oil prices did.

The Israeli nuclear community is driven today by an administration that reveres technology. At the moment, it is on the verge of purchasing a reactor that is the fruit of Western technology, one that has never been in operation, but is already out of date. In the United States, people are waiting today for technological developments in the field of nuclear energy and safety that will make their investments in nuclear power plants worthwhile. The process of building a nuclear power plant, from the theoretical beginning stages to the start of operations takes between 12 and 14 years. One of the factors in the nuclear debate is future speculation regarding the cost of oil, viability, and alternatives. In effect, the question is simple: What is the projected consumption of electricity in Israel in coming years and what is the electric company's projection for supplying power in those same years and beyond. This simple question has simple answers: Over the next 10 years, Israel will be capable of producing an additional 2,200 megawatts of energy. In 1996, the electric company will be able to supply, via stations powered by coal, 5,800 megawatts. In the year 2000, Israel will require less than that (5,500 megawatts to be exact). Apart from this ability, there is a reserve, which is not discussed, but which approximates another 500 megawatts. There are economisats who claim other figures. According to their claims, Israel is suffering from a surplus of electricity. The electric company has an interest in hiding this surplus from public knowledge.

A Question of Cost

The Luz company sells solar energy to the United States. The formula is simple--a square meter of sun for electricity equivalent to a barrel of oil a year. Why doesn't the Luz company sell solar energy to Israel? The cost of solar energy is still too high--five times the price of regular electricity. Comparing the cost of electricity produced from a nuclear reactor and that produced by a power station fueled with coal, the accepted calculation in government offices is that the price of a kilowatt from a nuclear station (including amortization of building costs) is around \$2,000. A kilowatt produced at a station powered by coal costs less than half.

From here on, the war of interpretations begins. 'Amos Horev, who sat as head of the ministers' energy commission which decided to point Israel in the direction of purchasing a nuclear plant, cannot re-examine his personal position in the prevailing atmosphere of uncertainty and panic. He just prays that the Soviet reports are true. "I believe in the facts and the facts are that fossil oil reserves do not renew themselves. Oil prices will not stay low forever and the price of mining coal will rise as the mines are depleted. This is a problem that all the solar heaters and mirrors in the world will not resolve." Horev wanted to give an immediate green light to continued contacts for purchasing a reactor.

"The question is not why not to buy, but why we should buy," says Professor Pazi, who opposes purchasing a nuclear reactor at this stage. "Those who want to buy--let them prove it worthwhile. It is not true that nuclear reactors supply cheaper electricity. The enormous dependence on foreign firms, the time it will take to add safety and security systems, and the problems that will be caused by activating a single nuclear reactor for the purpose of supplying electricity in Israel--all these make profitability difficult. He

who would claim that it is important to vary our energy sources is actually raising an absurd claim, because today we can buy coal from a wide variety of sources. All the while that power plants operated on liquid gas, the sources for which were never stable, there was room for this claim. But coal can be bought from everywhere."

"If Israel wants economic independence and if we do not get carried away with the idea that we might find oil or coal here, then we must base our energy on alternatives. The nuclear alternative is very serious," says Professor Dar. The fact that the price of oil is cheap today is working against those who negate the non-viability of operating a nuclear power plant. "But this situation will not persist forever," says Professor Dar. "The only interest is to get cheap electricity."

Supporters of nuclear energy like to talk about Israel's dependence on outside sources for oil and coal. What about nuclear materials? Dr Ben-Ya'akov reminds us that France has a proven history of instability insofar as her supply relations with Israel. And, there is, of course, the problem of nuclear waste. These are materials whose radioactivity will remain for generations. There is no assurance that France, frequently subject to anti-Israeli political pressure, will agree to accept Israel's nuclear waste for an extended period of time.

It is a moral issue, claims Professor 'Amit. "I have a right to decide not to fly on an airplane. Has it occurred to anyone that I should also have the right to decide if I am prepared to expose myself to radioactive fallout?"

Eshel Ben-Ya'akov deals with the extreme importance of our responsibility toward the future, toward generations to come. "Even if the price of electricity in Israel were to decrease by 20 percent, there is the possibility of a holocaust in Israel. This is the decision that must be made--are we prepared for this risk? "When you play Russian roulette with a country, you must know how many bullets are in the gun."

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CSO: 5100/4512

ISRAEL

FOUR UNDERGROUND REACTORS RECOMMENDED FOR NEGEV

Tel Aviv MA'ARIV in Hebrew 1 Jun 86 p 6

[Article by Avraham Peleg: "Famous American Jewish Scientist Points Out that the Reactors will be Advanced Models and Much Safer than Those at Chernobyl"]

[Text] The nuclear accident in Chernobyl in the Ukraine did not diminish Prof Edward Teller's strong support of nuclear energy. It did not change his recommendation that Israel, too, operate nuclear power plants. "Israel does not have to fear nuclear accidents," he says, "because the reactors she is planning on acquiring are safer and more sophisticated than the one at Chernobyl."

Prof Teller recommends that Israel construct and operate four nuclear reactors by the end of this century. Each of these reactors is to produce 1,000 megawatts. The reactors should be constructed underground with a protective shield of 20 meters.

"Protected reactors can withstand conventional bombing and terrorist attacks, and they will not endanger you in any way. The investment in security will not make construction much more expensive, if at all. The most suitable site for the purpose seems to me to be the Negev," says the famous nuclear scientist.

The American Jewish scientist, known as "the father of the hydrogen bomb," thinks that the Russians were lucky that the Chernobyl accident did not turn out to be a "China syndrome," since after the core melt-down radioactivity seeped into the ground and threatened to contaminate the Ukraine's water resources.

Kiev was also lucky in that during the first 2 days following the accident, when the reactor was still spewing out radioactive clouds, the wind swept them away from the big city. "All told, things did not reach a catastrophic stage although this was the very first melt-down," said Prof Teller.

Prof Teller was recently in Israel and participated in a meeting of the trustees of Tel-Aviv University. In an interview with MA'ARIV he was asked if on second thought he was still of the opinion that nuclear energy should have been introduced to the world. He responded: "I have known for 40 years that

reactors like the one in Chernobyl are unsafe. Actually, the only time I protested against unsafe reactors was in the case of the types utilized in Chernobyl. At the same time it should not be forgotten that nuclear energy has been produced for decades with no serious mishaps. On two previous occasions, in Windscale in Great Britain and on Three-Mile Island in the U.S., there were no fatalities. The Chernobyl accident is the first in which there were fatalities."

According to Prof Teller the accident in Chernobyl happened when the nuclear rods were replaced (which happens during normal operation) and capacity was reduced to 6 percent. It seems that the operators lost control and production jumped to 50 percent, which precipitated the explosion. In the next phase there was a melt-down, the first in the history of nuclear reactors. "This is the most serious accident that has ever happened, but all told, the Russians were lucky."

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CSO: 5100/4517

ISRAEL

GUIDELINES SET FOR RADIOACTIVE WASTE DISPOSAL

Jerusalem THE JERUSALEM POST in English 8 Jun 86 p 4

[Article by Judy Siegel]

[Text] New Health Ministry guidelines prohibit the disposal of radioisotopes through the sewerage system without a special permit, and require dangerous concentrations to be brought to the research facility in Dimona.

The guidelines, prepared by the ministry's institute for research in environmental health and the Atomic Energy Committee, were issued in response to last year's State Comptroller's report, which called for strict and clear rules regarding the disposal of radioactive material.

The ministry, however, admits it has little ability to supervise the hundreds of hospitals, research institutions and companies that use radioactive materials, but it insists that any institution caught violating the guidelines will be prosecuted.

Dr. Shmuel Brenner, radioactivity expert at the ministry's environment health institute, told *The Jerusalem Post* that there had been several cases of improper disposal of radioactive wastes. In one instance a hospital worker had been found

throwing some radioactive material into a garbage can. But, Brenner maintained, because of the small quantities involved, none of those incidents had posed danger to public health.

The ideal situation would be for all radioisotopes remaining after use to be brought quickly to Dimona, Brenner said. The quantities were so small, however, that this was not practical. On the other hand, if the wastes were stored at the facility in which they were produced for any period of time, they could constitute a danger to the people who work there.

As a result, the ministry will allow small concentrations of radioisotopes to be disposed of through the sewerage system, after a special permit.

The guidelines do not change the existing prohibition against the burning of radioactive waste material or the regulation which requires that human wastes from patients who have undergone radioactive treatment be disposed of in special toilets.

/13104
CSO: 5100/4518

PAKISTAN

BRIEFS

SCIENTIST ACQUITTED OF CHARGES--Pakistan's famed nuclear scientist, Dr Abdul Qadir Khan, has said that a Netherlands court's decision to acquit him of the charges of obtaining nuclear secrets not only proves his personal honesty and integrity but also reflects the peaceful nature of Pakistan's nuclear program. In an interview in Islamabad, he said that case had no sound basis as it was based on misunderstanding and false accusations. [Text] [Karachi Domestic Service in Urdu 0200 GMT 19 Jun 86 BK] /9274

DOMESTIC NUCLEAR FUEL SUPPLY--Pakistan is working on a nuclear reactor that would be fuelled indigenously. In a TV interview in Islamabad yesterday, the Pakistani nuclear scientists, Mr Abdul Qadir Khan, said this will ensure supply of domestic fuel to Pakistan's nuclear reactors in future. Once in this position, Pakistan will not be pressurized to accept unreasonable restrictions on its nuclear program. It may be recalled that Pakistan has been trying to set up a 900-megwatt nuclear plant in Chashma in Mianwali District for the last 3 years. But Western nations have made it clear that they would continue to oppose this plan until Pakistan signs the nuclear nonproliferation treaty and accepted the International Atomic Energy Agency safeguards of all of its nuclear plants. [Text] [Delhi Domestic Service in English 0830 GMT 19 Jun 86 BK] /9274

CSO: 5100/4747

CAMEROON

VISIT TO URANIUM DEPOSIT SITE DESCRIBED

Yaounde CAMEROON TRIBUNE in French 18 Mar 86 pp 1,4

[Article by Fabian Edogue: "Minister of Mines Tabong Visits Uranium Search Site"]

[Excerpts] The mountains enclosing the town of Poli are reported to contain uranium. To see for himself, Michael Kima Tabong, minister of Mines and Power, traveled to Poli 9 March. He was accompanied by the governor of Nord Province, Fon Fossi Yakum Ntaw.

The prospecting site at Poli was opened in 1981 and is the result of a cooperative effort between Cameroon and the Federal Republic of Germany (FRG). The purpose of the minister's visit was to learn whether the huge mountains encircling Poli like a magnificent crown actually contain uranium, and if they do, how the prospecting is progressing.

The heads of the gendarmerie and of the police, the chief of Nord Province Mines and Power Department in Garoua, and the governor's principal private secretary were observed accompanying the minister and the governor.

After traveling some 100 km on paved road, the party turned off under a blazing sun for Gouna. They quickly crossed the 40 km stretch of bumpy, dusty road between the Garoua-Ngaoundere highway and Poli, where a celebration awaited them. The prefect, flanked by local administrative political, and tribal leaders, greeted the minister and his entourage enthusiastically.

The visit to the project itself began at 0900 hours Monday, 10 March. The site is approximately 10 km from Poli and can be reached only by specially equipped vehicles because of the steep grades. Aided by the gendarmerie, the official visitors traveled to the camp of Domboukou, a village at an altitude 800 meters above Poli, and from there to the tunnels at the prospecting site of Kitongo.

Theodore Djapa Ngassam, the Cameroonian project manager, and his German counterpart, Peter Gehnes, conducted the tour and gave the minister an on-site explanation of the work.

The project is directed by two teams of mine engineers, one Cameroonian and the other German. The first phase of the project, which focused exclusively

on pinning down evidence of uranium, began in 1981 when the prospecting site was opened at Poli. That event followed visits to Cameroon by an FRG mission in 1977 and 1980. In 1985, the two countries renewed their partnership and embarked on the second phase, full-fledged prospecting.

The dispersion of uranium ore deposits within rock makes this work very difficult. The first tunnel dug measures 30 meters. The second and largest tunnel sinks 60 meters into the enormous rock mass. The mine engineers use specialized equipment to detect uranium from within the tunnels. When one of them places one of these instruments on a rock section, the detector emits sound signals indicating the area contains uranium. The minister and the governor entered the tunnels to see for themselves how the work is progressing.

The German technical assistants and the Cameroonian geologists agree that uranium prospecting is a difficult undertaking requiring much patience and heavy investment in personnel and materials to succeed. At this stage, cores are being drilled from the rock. They must be analyzed to determine their uranium content before mine development can begin.

After the visit to the site, the minister led an afternoon meeting of the research teams and the administrative, political, and police chiefs. He stressed how important the prospecting is and asked the administration and political officials to cooperate unstintingly with the technicians. For the benefit of the residents of Poli, he said that if the project takes shape, it will alter the face of their landscape completely. Uranium mining and processing will require much new construction, notably roads. He also remarked on the excellent collaboration between Cameroon and the FRG.

The minister asked the Cameroonian and German teams for concrete and tangible results that could be shown to the president in the near future.

In his turn, the governor said that the project opens avenues to jobs and other social benefits for Poli. He said he earnestly wants to see the project advance to the mine working stage. He assured the minister that he and his assistants are putting themselves at the service of the search teams and stand ready to give them all possible necessary assistance, provided their needs are expressed in a clear and timely way.

Before closing the meeting, the minister reminded Poli's newly elected representatives that the Party brought about this development project and strongly urged their close cooperation with the groups involved.

The minister and his entourage returned to Garoua 11 March after a well-received evening of cultural entertainment in the cool mountain climate of attractive Poli.

13220/9435
CSO: 5100/31

NIGERIA

USSR AMBASSADOR ON CHERNOBYL, UKIWE ON NUCLEAR USE

Kaduna NEW NIGERIAN in English 13 Jun 86 pp 1, 3

[Text]

COMMODORE Ebitu Ukiwe, Chief of General Staff, has repeated the Federal Military Government's views that nuclear energy only be used for peaceful and economic purposes.

Exchanging views with the Soviet Ambassador to Nigeria, Mr. Youri Koupliakou, in Lagos, yesterday, he said the Chernobyl nuclear accident in the Soviet Union had reinforced the government's views.

He however stated that the Soviet Union's call for the total elimination of all military uses of nuclear energy was in the right direction.

Commodore Ukiwe said Nigeria did not support any military use of nuclear energy and would participate fully in any international effort to put an end to it.

The Chief of General Staff said Nigerians were saddened by the Chernobyl accident and urged the Soviet envoy to convey Nigeria's sympathy to the government and people of the Soviet Union.

Mr. Koupliakou had earlier told the Chief of General Staff that he brought a special message from the Soviet leader, Mr. Michail Gorbachev to President Ibrahim Babangida.

The envoy said in the message the Soviet leader said the Chernobyl disaster had taught humanity the need to develop nuclear weapons only to accelerate economic development.

He said even for peaceful use, there was the need to develop special safe devices to harness the enormous powers of atomic energy.

Mr. Gorbachev also said there was an urgent need to rid the whole world of all nuclear armament, and called for an end to all nuclear tests meant for military purposes.

The Soviet leader then appealed to Nigeria, and the Non-Aligned Movement to co-operate fully with his country to achieve the noble objective of stopping nuclear proliferation.

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CSO: 5100/39

EUROPEAN AFFAIRS

BELGIUM OFFERS AID TO TURKEY FOR NUCLEAR PLANTS

TA261701 Ankara ANATOLIA in English 1625 GMT 26 Jun 86

[Text] Istanbul, 26/6 (A.A.) — The most reliable nuclear power plants of the world are manufactured by Belgium and you should cooperate with us to solve bottleneck in energy, said Belgium's State Minister Etienne Knoops.

Mr. Knoops, answering questions of the press after attending the "Turkey-Belgium Energy Symposium," stated that Belgium has a great accumulation of knowledge in nuclear power plant construction. If you want to solve the energy bottleneck, Belgium is ready to assist Turkey any time, Mr. Knoops said.

Should any accident have occurred in our plants resembling the Chernobyl accident, no victims would emerge as a result, the state minister said.

Reminding that trade relations between Turkey and Belgium are accelerating, Mr. Knoops stressed that his country has at all times taken a positive attitude towards Turkey's E.E.C. membership.

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CSO: 5100/2554

FEDERAL REPUBLIC OF GERMANY

MINISTRY APPROVES DISMANTLING OF BAVARIAN NUCLEAR PLANT

Duesseldorf HANDELSBLATT in German 16 Jun 86 p 16

[Article: "Demolition Costs Are Estimated at DM100 Million"; first paragraph is HANDELSBLATT introduction]

[Text] Munich, Saturday/Sunday, 14/15 Jun (HANDELSBLATT)--The Bavarian Environmental Ministry has granted approval for dismantling and removal of the Niederaichbach nuclear power plant (KKN) to the Karlsruhe Nuclear Research Center GmbH, the Noell GmbH, and the Nuclear Engineer Service GmbH.

Thus, for the first time in the history of the peaceful use of nuclear energy, a commercial nuclear power plant of this size will be dismantled.

Back in 1974, the carbon dioxide cooled, heavy water moderated pressure tube reactor of a now obsolete reactor type was shut down and "mothballed" because of technical inadequacies and uneconomicalness. It was in operation for only 18.3 days.

With this decision of the environmental ministry to grant approval for dismantling, an approval process of several years for the Niederaichbach demolition is completed. The Bavarian Environmental Ministry stressed in a statement that it was possible to give the green light for the demolition because the process led, after careful study, to the conclusion that within this project "life, health, and, third, property" would be protected and the other approval prerequisites named in the atomic law would be met.

All the same, the dismantling of the Niederaichbach nuclear power plant which is, to be sure, small with only 100 megawatts must be considered a pilot project. The dismantling process and the experience gained in the Landshut vicinity are also transferable to nuclear power plants of the size classification of up to 1,300 megawatts currently in operation. In 1983, demolition costs for the KKN were already estimated at DM100 million.

In the dismantling of the Niederaichbach nuclear power plant, because of radioactivity, it is primarily a matter of dismantling and breaking down parts of the facility, of separating radioactive from nonradioactive parts, and of packing, classifying, and transporting these away according to their characteristics and further use.

As a result of this work, approximately 3,500 metric tons of radioactive liquid waste, 1,500 metric tons of reusable radioactively contaminated steel, 1,200 metric tons of solid radioactive waste, and approximately 141,000 metric tons of nonradioactive materials, including 130,000 metric tons of building rubble, 10,000 metric tons of liquid waste, and 1,500 metric tons of steel, will be obtained.

The radioactive liquid waste is to be delivered to the Isar GmbH nuclear power plant and to be decontaminated there. The Karlsruhe nuclear research center will take the reusable radioactively contaminated steel for further processing in a smelter. The radioactive wastes are to go temporarily into a KKN interim drum storage facility until 1990 when transportation to and storage in the national ultimate waste storage facility planned by the federal government begin.

12666
CSO: 5100/2530

FEDERAL REPUBLIC OF GERMANY

NUCLEAR RESEARCH CENTER KFK OPENS SAFETY TEST FACILITY

Duesseldorf HANDELSBLATT in German 3 Jun 86 p 14

[Article: "Core Meltdown Accidents Modeled"; first paragraph is HANDELSBLATT introduction]

[Text] Duesseldorf, Monday, 2 Jun (HANDELSBLATT)--In the Karlsruhe Nuclear Research Center (KfK), a new test installation was recently put into operation in which the serious damage which occurs in the primary zone of a core meltdown accident in the fuel assembly of a nuclear reactor can be instigated and studied.

Sequences of events will also be reproduced like those which have come to be known under the name "Harrisburg accident": Overheating of an inadequately cooled reactor core in the temperature range of from 1,200 to over 2,000°C with local meltdown and embrittlement processes which result upon subsequent flooding in partial collapse of the core structure. The objective of these tests is a quantitative description of the safety reserves which exist before the uncontrolled, complete meltdown of the reactor core.

"With the results of these tests, the conservative overestimations of the sequences of events and the consequences of such accidents which are still utilized today can be brought into line with reality," wrote the KfK on this subject in a press release which originated in the period before the reactor accident in Chernobyl.

Current risk studies are reportedly "still based on an overestimation which lies on the safe side," that, with a coolant loss accident--perhaps because of relatively slight leakage and failure of the emergency cooling system--above a temperature of 1,200°C, an uncontrolled meltdown of the reactor core will always have to be reckoned with. The Three Mile Island Accident in Harrisburg revealed, however, that exceeding the interpretational limit of 1,200°C accepted at that time does not inevitably lead to an uncontrolled core meltdown, but rather that superelevation of the temperature begins at much higher temperatures and that the reactor core can be brought back into coolable condition in spite of severe damage.

Due to a drop in the water level in the pressure vessel in the event of coolant loss accidents and simultaneous failure or delayed start-up of emergency cooling, an incomplete cooling of the nuclearly disconnected fuel assemblies which begins on the upper end of the reactor core and continues downward using a stream of steam--rather than the more effective stream of water--must be reckoned with. In this case--as already partially simulated experimentally at the nuclear research center--the following sequence of events occurs:

The fuel rod cladding jackets made of zircalloy soften with the increasing temperature and swell because of the high internal pressure of the fuel rods. This process can lead to bursting of the cladding jackets. With increasing temperature, the components of the fuel elements are oxidized by the oxygen in the water vapor. This oxidation leads to embrittlement of the materials. The oxidation of the zircalloy by the water vapor is an exothermic reaction which leads to further elevation of the temperature. Simultaneously, on the inner side of the fuel rod cladding tubes a chemical reaction occurs between the zircalloy and the uranium dioxide of the nuclear fuel with the production of low melting point phases.

Also, the material in the absorber rods exercises a considerable influence on the high temperature behavior of the core structure. With the subsequent flooding of the overheated reactor core through the emergency cooling system, the temperature shock which occurs then leads to fragmentation of the oxidation embrittled materials.

In the new "Cora" facility, the reactions described are scientifically measured in bundles of up to 45 2-meter-long fuel rods. The fuel rods are filled with the uranium dioxide tablets which are also used in nuclear reactors. Twenty-four fuel rods in the bundle can be heated over a length of 1 meter by an electric resistance heater with an output comparable to nuclear reactions. Thus, bundle temperatures of up to more than 2,000°C with heating rates of from 0.5 to 4°C per second are achievable.

Lateral temperature distribution--similar to that in the unit of a complete reactor core--is assured by a high temperature shield, the inner surface of which is composed of heat resistant zirconic oxide fibers, surrounding the bundle.

The incomplete steam cooling of the fuel elements is provided by a corresponding steam supply system, which bombards the the hot fuel rod bundle with steam superheated up to 1,000°C under pressures of up to 10 bar. The superheated fuel rod bundle can be flooded by a flooding vessel which can be raised hydraulically over the bundle from beneath. The huge amount of steam suddenly occurring with this is collected by high volume condensers.

The entire installation is designed for the reactions which proceed violently in this experiment: Among other things, there are even precautions against possible hydrogen explosions. "Cora" is located within the containment of the shut-down FR2 reactor and is still further protected by its own pressure tight containment. All measurement data such as temperatures and pressures in the fuel rod bundle are collected by a number of sensors or remote measurement

devices via a computerized data logging system. At the end of a test, the fuel rod bundle can be visually inspected by lowering the flooding vessel and the high temperature shield.

The facility was erected in a period of 4 years at a cost of approximately DM2 million by the engineering technology division of the KfK. The subsequent test campaign is expected to last until the end of 1987 with approximately 15 to 20 individual tests, each costing some DM30,000.

Following the reactor catastrophe in Chernobyl, statistical evidence about the likelihood of the occurrence of the most serious reactor accidents will certainly be scrutinized. In this connection the tests in the Karlsruhe Nuclear Research Center will attract the highest interest.

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CSO: 5100/2530

FEDERAL REPUBLIC OF GERMANY

KFK RESEARCH CENTER DEVELOPS METHOD FOR SEPARATING WASTE GAS

Duesseldorf HANDELSBLATT in German 30 Jun 86 p 12

[Article by n1: "New Process Developed for Separating Inert Gas Krypton 85"]

[Text] Recently, development of a process for separating the radioactive inert gas Krypton 85 -- the Kreta process -- was successfully completed at the Karlsruhe Nuclear Research Center (KfK) after a trial run of about 3 months. The process, developed over 12 years at a cost of about DM50 million, was designed to help decrease emissions at the Wackersdorf reprocessing plant. In a reprocessing plant melter, the nuclear fuel still remaining and the fission products formed in the reactor are dissolved from the fuel rod jackets with hot nitrous acid. At the same time, liquid or gas fission products such as iodine, krypton, xenon, as well as radioactive aerosols pass into the waste gas emissions of the melter. Because of its radiological importance, waste gas purification has played an essential role in the KfK research and development program within the framework of reprocessing and waste treatment project development. Methods for separating radioactive aerosols and radioiodine, necessary for radiation protection, were tested at the Karlsruhe reprocessing facility and the Pamela vitrification plant for highly radioactive waste in Mol, Belgium. Krypton 85, on the other hand, is a weak beta-emitter with a half life of 10.6 years which must be separated and placed in final storage in order to prevent contamination of the environment as much as possible.

The Karlsruhe Nuclear Research Center developed a cryogenic process for separating the krypton. Before cryogenic treatment, melter waste gas which has been purified of aerosols and radioiodine is then cleansed by using filters, catalyzers and molecular absorbers to remove the components oxygen, nitric oxide, carbon dioxide and steam which interfere with the cryogenic process. The remaining waste gas, over 98 percent of which is nitrous, is then fed into the cryogenic stripper columns of the Kreta plant together with the fission products krypton and xenon. At temperatures of 100 to 200 Kelvin (approximately -170 to -70 degrees Celsius), krypton and xenon are separated from the nitrous substrate in a first countercurrent column and then separated from one another in a second countercurrent column. Although this cryogenic rectification is a simple process in principle, it was necessary while developing the Kreta process to examine not only extensive basic research on the reaction of matter to low temperatures and radiation, but also a large number of questions regarding possible interference.

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END